LONDON-WEST MIDLANDS ENVIRONMENTAL STATEMENT

Volume 5 | Technical Appendices

CFA13 | Calvert, Steeple Claydon, Twyford and Chetwode

Survey reports (CH-004-013)

Cultural heritage

November 2013

ES 3.5.2.13.7

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Contents

List of tables

1 Introduction

1.1 Structure of the cultural heritage appendices

1.1.1 The cultural heritage appendices for the Calvert, Steeple Claydon, Twyford and Chetwode community forum area (CFA13) comprise:

- baseline reports (Volume 5: Appendix CH-001-013);
- a gazetteer of heritage assets (Volume 5: Appendix CH-002-013);
- an impact assessment table (Volume 5: Appendix CH-003-013); and
- survey reports (this appendix).

1.1.2 Maps referred to throughout the cultural heritage appendices are contained in the Volume 5, Cultural Heritage Map Book.

1.2 Surveys undertaken

1.2.1 This appendix contains the results of a series of archaeological surveys. These surveys comprised:

- a fully-integrated remote sensing survey incorporating light detection and ranging (LiDAR), hyperspectral imagery and aerial photographic analysis of the majority of the Proposed Scheme;
- geophysical surveys at four locations along the route (site codes (from south-east to north-west): AV0AE, AV0AB, AV0AC, AV0AD), encompassing a total of approximately 53.3ha; and
- an archaeological fieldwalking survey at one site (site code: AV0AC), encompassing approximately 6.7ha.

1.3 Surveys proposed but not undertaken

1.3.1 In addition to the surveys reported on in this document, one further location within CFA13 was proposed for geophysical survey, but due to access or other restrictions this survey was not carried out. The proposed survey site was located on land to the east of Glebe Farm, Waddesdon (site code: AV0AF; NGR: SP 6811 2585).

2 Remote sensing survey report

2.1 Introduction

2.1.1 This report outlines the results of the archaeological remote sensing survey of the Calvert, Steeple Claydon, Twyford and Chetwode area. This was an archaeological survey involving the systematic analysis, interpretation, mapping and recording of archaeological sites from aerial photographs, hyperspectral imagery and LiDAR imagery.

2.1.2 The aim was to map and record the form and extent of archaeological features visible as cropmarks, soilmarks, earthworks or structures on a range of different remote sensed imagery for the study area, in order to inform the baseline assessment of the cultural heritage resource. The objective was thereby to facilitate the assessment of impact, and the formulation of mitigation strategies.

2.1.3 The study area has not been covered by an English Heritage national mapping programme project. The Northamptonshire national mapping programme[1,2] included only the very northern tip of the CFA13 study area, although no features were recorded there during that survey[3]. The Thames Valley and Hertfordshire national mapping programme project areas[4,5] fall to the south and south-east. Therefore there is no existing systematic survey of archaeological features visible on remote sensed sources for CFA13.

The study area

2.1.4 The study area for this remote sensing survey covers the entire length of CFA13, which falls mostly within Buckinghamshire. A small tip of Oxfordshire protrudes into the study area at one point.

2.1.5 The study area generally comprised a 700m-wide strip centred on the route (350m either side of the centre line). This provided a buffer sufficient to offer contextual information for all recorded sites. Where the Proposed Scheme boundary extended beyond the edge of the 700m-wide strip, the study area was expanded to the limit of the remote sensing survey boundary shown on Figures CH-004-013.include this extent.

2.1.6 In total the CFA13 archaeological remote sensing survey covered an area of 8.7km².

2.2 Methodology

2.2.1 In order to provide consistency with other similar datasets (namely English Heritage national mapping programme mapping), the archaeological remote sensing survey was carried out in broad accordance with the current version of the English Heritage national mapping programme standards[6]. The interpretations applied to identified features are consistent with the preferred terms within the English Heritage Monument Type Thesaurus[7].

[1] Deegan, A., (2002), *Northamptonshire NMP Project: management report,* English Heritage and Northamptonshire County Council, Unpublished Report.
[2] Deegan, A. and Foard, G., (2007) *Mapping Ancient Landscapes in Northamptonshire*, English Heritage, Swindon.
[3] Due to a restricted methodology that did not generally include, for example, ridge and furrow.
[4] Fenner, V.E.P., (1994), *The Thames Valley Project: a report for the National Mapping Programme*, RCHME Aerial Survey Report Series.
[5] Fenner, V.E.P., (1992), *Crop Marks in Hertfordshire: a report for the National Mapping Programme*, RCHME internal document.
[6] Winton, H., (2012), *Standards for National Mapping Programme projects, Version 0.1* Draft, English Heritage, Aerial Investigation and Mapping, Typescript document.
[7] English Heritage; NMR Monument Type Thesaurus; http://thesaurus.englishheritage.org.uk/thesaurus.asp?thes_no=1; Accessed: August 2012–June 2013.

Sources: modern aerial photographs

2.2.2 High resolution (12.5cm) vertical aerial orthophotography taken specifically for the purposes of the project was made available for this survey. This imagery was captured during 2012. It generally consists of a 700m-wide strip centred on the route, although it is slightly wider in some areas. It was viewed digitally within a geographical information system (GIS) program. The level of accuracy of the orthorectification is such that features mapped from this source should be within 15cm of true ground position.

2.2.3 Pre-existing vertical aerial orthophotography dating from the 1990s and 2000s was also made available for this survey. This was supplied under the Pan-Government Agreement. The resolution is 25cm. The level of accuracy of the orthorectification is such that features mapped from this source should be within 1.5m of true ground position[8]. This vertical imagery was also viewed on-screen within GIS.

Sources: historic aerial photographs

2.2.4 All readily-available historic vertical and oblique aerial photographs held in archives were also consulted for this project. This included photographs held at the English Heritage Archive (formerly the National Monuments Record) and the Cambridge University Unit for Landscape Modelling. The latter is also referred to as the Cambridge University Collection of Aerial Photography.

2.2.5 The 125 historic vertical aerial photographs of the study area in the English Heritage Archive (see Table 5) were taken for non-archaeological purposes between 1946 and 1993, by organisations such as the Royal Air Force (RAF) and the Ordnance Survey (OS). These photographs often captured sites of historic interest incidentally, especially those shots taken in the first half of the 20th century before archaeological remains may have been damaged or destroyed by the intensification of arable farming.

2.2.6 The 49 historic oblique aerial photographs of the study area in the English Heritage Archive (see Table 6) were taken between 1929 and 2011 and usually targeted known sites of architectural or archaeological interest. They were typically taken at a much larger scale than the 'blanket' vertical aerial photography, and were often timed to capture images of archaeological sites when they were at their most visible, i.e. when dry ground conditions favoured the development of clear cropmarks, or when low winter sun would reveal subtle earthworks.

2.2.7 Thirty aerial photographs from the Cambridge University Collection of Aerial Photography fell within the study area (seeTable 7). These were vertical and oblique aerial photographs dating from between 1948 and 1993. As with the English Heritage aerial photographs the oblique photographs are more likely to have been taken for archaeological purposes than the vertical photographs. The vertical aerial photographs, however, still had the potential to inadvertently capture evidence of archaeological remains.

2.2.8 All aerial photographs in the English Heritage and Cambridge University Collection of Aerial Photography archives which fell within the study area were viewed in person and examined stereoscopically and under magnification where applicable. Copies were obtained where potential archaeological features were identified and the relevant photographs were considered to be of use either for transcription or for reference purposes.

Sources: LiDAR imagery

2.2.9 High resolution LiDAR data acquired specifically for the purposes of the project was made available for this survey. This data was captured in 2012. It generally consists of a 700m-wide strip centred on the route, although it is slightly wider in some areas.

2.2.10 The resolution of the data supplied was 20cm. The level of accuracy of the orthorectification was such that features mapped from this source should be within 15cm of true ground position. The raster digital elevation model was viewed directly within GIS. The digital elevation model is LiDAR data that has been processed to provide a representation of the ground surface without objects such as vegetation or buildings. This means that archaeological earthworks can be revealed on the LiDAR imagery, even if they lie beneath areas of woodland[9].

Sources: hyperspectral imagery

2.2.11 Hyperspectral imagery taken specifically for the purposes of the project was made available for this survey. This imagery was captured during a series of 'runs' in 2012 and provides a considerable buffer beyond the edge of the remote sensing survey study area boundary[10].

2.2.12 Thirty-four separate spectral band widths were captured, ranging from 406.075 nanometres to 992.065 nanometres. The band widths varied slightly between 16.280 nanometres at the lower end of the spectrum to 18.280 nanometres [11]. For each of the areas surveyed, varying combinations of three different bandwidths were analysed, with particular reference to bands 7–13 (882.725 nanometres to 773.255 nanometres) and bands 18–22 (683.435 nanometres to 612.185 nanometres), as these have been shown previously to be useful in archaeological remote sensing[12].

2.2.13 The hyperspectral imagery was viewed directly within GIS, as automated classification software does not work well with such high resolution data due to the prolifically varied response obtained from a single small area[13].

Sources: historic environment record data

2.2.14 Data from the Buckinghamshire and Oxfordshire historic environment record (HER) was supplied for the survey. These records were used as a reference to aid interpretation of features visible on remote sensed imagery, either through a pre-existing identification of a visible feature, or by providing information that could help characterise the likely cultural heritage resource of the area.

[8] GeoStore; Aerial Photography RGB Product; http://www.geostore.com/geostore4/WebStore?xml=geostore4/xml/productsAPRGB.xml; Accessed: August 2013.

[9] This can sometimes depend upon the time of year that the LiDAR imagery was captured.
[10] Hyperspectral runs 9a, 10b, 13, 14, 17a and 18 covered CFA13.
[11] Blom, (2012), *HS2 Hyperspectral Information*, BLOM Project Number: 03/037/12.
[12] Powlesland, D., Lyall, J. and Donoghue, D., (1997), *Enhancing the record through remote sensing: the application and integration of multi-sensor, non-invasive remote sensing techniques for the enhancement of the Sites and Monuments Record*, *Internet Archaeology 2;* http://dx.doi.org/10.11141/ia.2.4; Accessed: 18 December 2012.
[13] Powlesland, D., Lyall, J. and Donoghue, D., (1997).

2.2.15 The HER data was supplied as points, lines and polygons, with identifying attribute data attached. Full monument record reports were also supplied as a Portable Document Format document. The data supplied covered the entirety of the Buckinghamshire and Oxfordshire HER areas, creating an ample buffer to provide contextual information for any archaeological sites of interest within the boundary of the remote sensing study area.

Sources: national record of the historic environment data

2.2.16 Monument data from the national record of the historic environment, held by English Heritage, was supplied for the survey. This data was used as a reference to aid interpretation of features visible on remote sensed imagery, either through a pre-existing identification of a visible feature, or by providing information that could help characterise the likely cultural heritage resource of the area.

2.2.17 This data was supplied as points, lines and polygons with identifying attribute data attached. Full monument record reports were also supplied as a Portable Document Format document. The data covered a 10km-wide strip (5km each side of the route centre line), thereby providing an ample buffer beyond the boundary of the remote sensing study area.

Sources: cartographic sources

2.2.18 Historic OS mapping was supplied for the purposes of the survey. The map tiles had been geo-referenced and were viewed digitally in GIS. Epochs 1–4 of the 1:2500 scale County Series maps, which typically date from 1898 onwards, were used as a reference to aid interpretation of features visible on the remote sensed imagery.

2.2.19 In general where features such as field boundaries, trackways, extractive pits or ponds were marked on a historic OS map, they were not mapped and recorded as part of this survey. This is because the objective of this project was to add to the known record, not duplicate it. Nevertheless, where the full extent or form of a feature was not recorded in its entirety on the historic maps, it was included in the transcription for this project.

Interpretation, rectification and mapping

2.2.20 All vertical and oblique images from the sources identified above were systematically examined for any archaeological features visible as cropmarks, soilmarks, earthworks or structures. In accordance with best practice for remote sensing surveys, all available sources for each field or land parcel were viewed in conjunction in order to enable the most accurate interpretation possible.

2.2.21 Where archaeological features were visible on the LiDAR or aerial orthophotography, a detailed transcription, including all visible elements of the site in question, was carried out in ArcMap 10.1.

2.2.22 Where additional sites, features or details were visible on the historic aerial photographs from the English Heritage Archive, these images were rectified using the computer program Aerial 5.33 prior to their import into ArcMap for transcription.

2.2.23 Digital OS MasterMap 1:1250 base maps were used to establish control points (it should be noted that even when 1:1250 scale data is obtained, the scale of the mapping for rural areas is only in fact 1:2500[14]). Six or more control points were used for each photograph, with errors kept below 1m for each control point. This provided an accuracy of less than 1m to the base map for the rectified photographs.

2.2.24 A Digital Terrain Model (DTM) in the form of 5m point data was used in order to further refine the accuracy of the rectifications. The DTM was supplied for the purposes of the project.

2.2.25 The OS advise that their 1:1250 scale MasterMap data has an accuracy of 0.5m root mean square error for urban areas, and 1.1m root mean square error for rural areas[15]. Therefore, archaeological features transcribed from photographs rectified using this data will on average be accurate to within 1m–2m of their British national grid coordinates.

2.2.26 As already noted, in order to ensure consistency with other similar remote sensing datasets, this project was carried out in broad accordance with current national mapping programme standards and guidance. As such, the identified features were transcribed onto the standard national mapping programme drawing layers, using standard national mapping programme conventions[16] as detailed in Table 1.

Table 1: Layers used in GIS for digital transcription of archaeological features[17]

Layer name	Colour	Description
Bank	Red	Defines the outline of positive features such as boundary banks or windmill mounds. Thin banks, or those too diffuse to define accurately are included on this layer as a single line.
Ditch	Green	Defines the outline of negative features such as boundary ditches or hollow ways. Thin ditches, or those too diffuse to define accurately are included on this layer as a single line.
Large cut feature	Blue	Defines the outline of sizeable negative features such as quarries or extractive pits.
Levelled ridge and furrow outline or direction	Magenta	Defines the outline of a single block of ridge and furrow seen either as a cropmark, or an earthwork later known to have been levelled. An arrow within each single block indicates the direction of ploughing.
Extant ridge and furrow outline or direction	Cyan	Defines the outline of a single block of ridge and furrow seen as earthworks on the latest available remote sensed imagery. An arrow within each single block indicates the direction of ploughing.
Extent of area	Grey	Defines the extent of large features such as the perimeters of WWII airfields and military camps.
T-hachure	Dark blue	Top of the 'T' defines the top of a slope or scarp edge such as a lynchet or house platform. Body of the 'T' indicates the length and direction of the slope.
Structure	Purple	Defines the extent of surviving buildings and structures such as individual WWII Nissen Huts and pillboxes. Thin structures such as walls or concrete paths are included in this layer as a single line.

[14] Ordnance Survey; Products and Services FAQs: How accurate are your products?; http://www.ordnancesurvey.co.uk/oswebsite/support/products-services.html; Accessed: June 2013.
[15] Ibid.
[16] Winton, (2012), *Standards for National Mapping Programme projects.*
[17] Table 1 based on Winton, (2012), *Standards for National Mapping Programme projects,* Section 7.5. P31.

2.2.27 Table 2 and Table 3 show period range and evidence range abbreviations used. The evidence abbreviations identify the form in which a feature is visible on the remote sensed imagery.

2.2.28 Information relating to each of the transcribed features was recorded in the ArcMap attribute table. This included details such as the interpretation of each feature and the remote sensed source they were transcribed from, as well as the HER and national record of the historic environment numbers for the features if applicable. These results have been set out in Table 4 of this report.

Table 2: Period range abbreviations used in the GIS attribute data

Period	Abbreviation	Date range
Neolithic	N	4,000 – 2,400 BC
Bronze Age	BA	2,400 – 700 BC
Iron Age	IA	700 BC – AD 43
Roman	RO	AD 43 – 410
Early medieval	EM	AD 410 – 1066
Medieval	MD	AD 1066 – 1540
Post-medieval	PM	AD 1540 to 1901
20th century/modern	C20	AD 1901 – present
World War II	WWII	1939 to 1945
Uncertain	UN	

Table 3: Evidence abbreviations used in the GIS attribute data

Evidence	Abbreviation
Cropmark (includes soilmarks)	C
Earthwork	E
Levelled earthwork	LE
Destroyed monument (i.e. quarried-away)	DM
Structure	S

2.2.29 The results of this remote sensing survey and transcription have been saved in the project ArcMap MXD and have been supplied with all of the additional required metadata attached. The results have also been exported as Esri shapefiles for ease of import into other GIS programs where necessary in compiling the baseline survey.

2.3 Limitations

2.3.1 In some areas, the 2012 LiDAR and aerial orthophotography did not to cover the full extent of the Proposed Scheme.

2.3.2 Where archaeological sites have been identified solely from remote sensed imagery without confirmation from archaeological excavation or supporting evidence in the form of find-spots etc., it should be noted that the interpretation may be revised in the light of further investigation.

2.3.3 It should be stressed that the absence of an archaeological feature on remote sensed imagery does not confirm its absence in the ground, as visibility from the air is sometimes dependent upon a complex combination of factors. These include:

- unsuitable conditions at the time of image capture (such as lighting, ground moisture content and crops or other ground cover);
- variable quality of photography;
- underlying features being masked by alluvial build-up; and
- areas where archaeological features either do not survive or have never existed.

2.3.4 During the survey, 'steps' of approximately 2m were noted at several points in the purpose-flown 2012 vertical orthophotography, where adjacent image tiles had been joined to provide continuous coverage of the Proposed Scheme.

2.3.5 Archaeological features were not mapped beyond the boundary of the remote sensing survey study area, as the cumulative effect of this along the entire length of the route would have resulted in a significant increase in the study area. Where archaeological cropmarks, earthworks, soilmarks or structures continued beyond the study area boundary, this was noted in the attribute data of the mapped feature.

2.3.6 The hyperspectral imagery obtained for the purposes of the project did not include spectral bands in the short-wave to mid-infrared/thermal wavelengths (2080 nanometres – 13000 nanometres), which have been shown in the past to be of particular use in assessing archaeological potential. The mid-infrared/thermal range is especially likely to reveal subtle cropmarks or soilmarks that are not strong enough to be detectable in the visible part of the spectrum, due to the fact it will display very slight differences in water content present within both vegetation and the ground[18].

2.4 Assumptions

2.4.1 Information on the positional accuracy of the hyperspectral imagery has not been supplied. As such it is assumed that the accuracy of the orthorectification of this source is at least as good that of the Aerial 5.33 program outlined in Section 2.2 of this report - i.e. transcribed features will be accurate to within 1m-2m of true ground position. See, however, the note in Section 2.3 of this report regarding the 2m 'step' observed in some locations.

2.5 Results: description

2.5.1 The primary output of the archaeological remote sensing survey of the Calvert, Steeple Claydon, Twyford and Chetwode study area is the detailed digital transcription of each identified potential archaeological feature. Information pertaining to the interpretation of these features is contained within the attribute data of every line and polygon drawn in GIS.

[18] Powlesland, D., Lyall, J. and Donoghue, D., (1997).

2.5.2 Table 4 itemises in detail the results of the survey of the Calvert,Steeple Claydon, Twyford and Chetwode study area. These details originate from the GIS attribute data. The results should be read in conjunction with Figures CH-004-13.01–09 of this report.

2.5.3 Where a single mapped feature has generated two lines of identical attribute data[19], the duplicate line has been removed from Table 4. Where the transcription of a site or feature consists of several lines or polygons which may have been visible on different sources, or in a different form (i.e. where different elements of the site are visible as both cropmarks and earthworks), the differing lines of the attribute data table have been retained in order to reflect these variations.

2.5.4 The Aerial Survey ID is the unique identifier applied to each site or feature transcribed during this project. It was not considered sufficient to use the automatically generated 'feature ID' within GIS, as this would result in a site which consisted of several different features represented by different lines and polygons having several different identifying numbers. The Aerial Survey ID was also used to group features, such as several interconnecting former field boundaries. This is consistent with the approach taken by English Heritage on national mapping programme projects[20]. The Aerial Survey ID is prefixed with a different sequential letter for each CFA. For CFA13 it is the letter 'M'.

2.5.5 The national record of the historic environment and HER columns detail the relevant monument numbers for these authorities, where such numbers exist for transcribed features.

2.5.6 The Period abbreviations used are set out in Table 2.

2.5.7 As noted in Section 2.1 of this report, the interpretation types (detailed in the Type column) comply with the preferred terms within the English Heritage Monument Type Thesaurus[21] in order to achieve consistency with other similar transcribed datasets.

2.5.8 The Evidence abbreviations refer to the physical nature of the recorded features. These abbreviations are set out in Table 3.

2.5.9 The remote sensed imagery used to transcribe each individual feature is detailed in the Source column.

2.5.10 The description column is intended as a brief interpretation only, outlining the main features or points of note.

2.5.11 The full attribute table attached to every line and polygon transcribed as part of this survey contains additional columns not displayed in Table 4, such as the date the feature was transcribed and the initials of the member of staff responsible, etc.

[19] Such as a block of ridge and furrow, which contains this information within both the polygon that defines its extent and the line indicating the direction of ploughing.
[20] Winton, (2012), *Standards for National Mapping Programme projects*.
[21] English Heritage; *NMR Monument Type Thesaurus*.

Table 4: Exported GIS attribute data for each transcribed feature, detailing the interpretation applied

Aerial survey ID	National record of the historic environment reference	HER reference	Period	Type	Evidence	Source	Description
M01			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	Partially levelled ridge and furrow is visible on LiDAR as extant earthworks.
							Possible former ridge and furrow is just visible on LiDAR as the faintest of earthworks. Almost completely levelled. This field covered by an area of recently-planted woodland. Ridges not on the same alignment as the trees in the plantation.
							Possible ridge and furrow is visible on LiDAR as extant earthworks.
							Possible ridge and furrow is visible on LiDAR as extant earthworks. Bisected by what appears to be something like a pipeline.
							Possible ridge and furrow is visible on LiDAR as faintly extant earthworks. Two different directions of ploughing visible on the LiDAR, which makes it difficult to be certain of the interpretation.
							Ridge and furrow is visible on LiDAR as extant earthworks. Likely to continue to the west across the remainder of the field, but not mapped beyond the project boundary.
							Ridge and furrow is visible on LiDAR as extant earthworks. Likely to have originally continued beyond the drain to the east, as is the case in the field to the south, but that area has been levelled by more recent ploughing.
						Pan-Government Agreement SP6924 16-June-2003 / HS2 LiDAR 2012	Ridge and furrow is visible earthworks across this field. Appears to be cut by later drain leading to/from duck decoy pond to the south (M02). Continues to east, but not mapped beyond the project boundary.
					E / LE	NMR RAF-CPE-UK-2159 3140 13-June-1947 / HS2 LiDAR 2012	Ridge and furrow which was visible on vertical aerial photographs of 1947 as extant earthworks appears to have been levelled by the time of the 2012 LiDAR.
			PM	Steam ploughed ridge and furrow	E	HS2 LiDAR 2012	Possible post-medieval ridge and furrow is visible on LiDAR as earthworks. Much narrower, straighter and more regular than nearby fields of possibly earlier ridge and furrow.
				Plough headland	E	HS2 LiDAR 2012	A possible plough headland is visible on LiDAR as earthworks. Appears to be associated with the adjacent field of possible post-medieval steam ploughed rig.
M02 (CAL002)		0413900000	PM	Decoy Pond	E	HS2 LiDAR 2012	Duck decoy pond clearly visible as extant earthworks on LiDAR, beneath trees of Decoypond Wood. Square in plan view with tapering 'pipes' leading from each corner. Connects with network of ditches beyond. Not on historic OS maps. Well preserved.
				Decoy pond/ water supply and drainage	E	HS2 LiDAR 2012	Network of water supply and/or drainage channels visible on LiDAR beneath the trees of Decoypond Wood. Connect to the decoy pond 'pipes'; the octagonal ditch surrounding the pond; or the drain (on OS map) to the north. Not on historic OS maps.
							Network of water supply and/or drainage channels visible on LiDAR beneath the trees of Decoypond Wood. Form an octagonal ditch in plan view around the outside of the decoy pond. South-west side of octagonal shape clipped by railway embankment.
M03			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	Possible ridge and furrow is visible on LiDAR across the Sports Ground. May alternatively be later landscaping of the Sports Ground, but it appears to have the characteristic curve of ridge and furrow.
							Possible ridge and furrow is visible on LiDAR beneath trees. Would have been continuous with the area to the north, but now divided by a later drain.
M04 (CAL051, CAL054)		0674500000 0296100000	MD	Shrunken village	E	HS2 LiDAR 2012	A field which is now a cricket pitch displays an uneven and irregular surface appearance on LiDAR. It is possible that the earthworks of the medieval settlement to the west originally extended into this area, but were later almost completely levelled.
							Possible remains of the medieval settlement are visible as earthworks on LiDAR. Short lengths of bank or mounds may represent former toft and croft boundaries, and house platforms.
							Possible remains of the medieval settlement are visible as earthworks on LiDAR. Short lengths of bank or mounds may represent

Aerial survey ID	National record of the historic environment reference	HER reference	Period	Type	Evidence	Source	Description
							former toft and croft boundaries, and house platforms. Alternatively may be part of the modern farm workings.
							Two lengths of linear bank are visible on LiDAR as earthworks. May be boundary banks or structural remains of the medieval deserted settlement.
				Shrunken village/ boundary ditch	C	Pan-Government Agreement SP6626 15-April-2007	A network of interconnecting ditches are visible on aerial photographs as cropmarks on the low-lying ground on the eastern side of the river. May have been toft and croft boundaries of the wider area of shrunken medieval settlement.
					E	HS2 LiDAR 2012	A network of interconnecting ditches are visible on LiDAR as extant earthworks. Continue to south but not mapped beyond edge of the study area. May have been toft and croft boundaries of the wider area of shrunken medieval settlement.
				Shrunken village/fishponds	E	HS2 LiDAR 2012	A series of three possible fishponds, of decreasing size, are visible as earthworks on LiDAR. Cut on western side by a modern trackway or ditch, which confuses the interpretation.
				Shrunken village/hollow way	E	HS2 LiDAR 2012	A possible hollow way is visible as an earthwork on LiDAR. Re-used as a modern boundary, but not marked on historic maps. May have joined with stretch of hollow way to the east. Eastern end may have been modified for modern drainage.
							A possible hollow way is visible on LiDAR. Amongst possible building and/or boundary remains also visible as extant earthworks. All these earthworks are thought to be part of the medieval shrunken part of the settlement still in use today.
							A possible medieval hollow way is visible on LiDAR as a curvilinear earthwork. Confused at western end, where it appears to split into two. The southern 'branch' may be later interference.
							A stretch of possible hollow way is visible on LiDAR as a linear earthwork. Flanked on northern side by a linear bank.
				Shrunken village/pond	E	HS2 LiDAR 2012	A possible pond is visible on LiDAR as a sub-circular hollow. Could alternatively be a natural feature such as a solution hollow, or a later extractive pit.
			MD / PM	Shrunken village/boundary bank	E	HS2 LiDAR 2012	A short L-shaped bank is visible as an earthwork on the western side of the river. Possibly associated with the shrunken village remains around the northern end of Twyford, although it could also be a later unrelated feature.
M05			MD / PM	Windmill mound	E	HS2 LiDAR 2012	A possible windmill mound is visible on LiDAR. This is approximately 140m to the south of the position of another windmill mound recorded in the HER (0023800000), national record of the historic environment (341018) and on the modern OS map. That one is also visible on aerial photographs.
							Possible windmill mound. Mound and ditch truncated to the south-west by field boundary. Could alternatively be the result of some later agricultural activity, but it seems to be a likely candidate for a windmill mound. Similar in form to the one to the north.
							This windmill mound is visible as an oval bank with a slight hollow in the top (not clear whether this is original or a result of later disturbance). It is surrounded by a ditch also visible as an earthwork. Cuts the earlier ridge and furrow.
M06			PM / UN	Extractive pit/quarry	E	HS2 LiDAR 2012	A large oval hollow may be a former extractive pit. Cannot rule out the possibility that these earthworks are in some way associated with the medieval remains to the north. Could also be a natural feature.
M07			PM / UN	Extractive pit/quarry	E	HS2 LiDAR 2012	A large oval hollow may be a former extractive pit. Truncated on north-east side by field boundary. Cannot rule out the possibility that these earthworks are in some way associated with the medieval remains to the north. Could also be a natural feature.
M08 (CAL118)		0734900000	PM / C20 / UN	Drainage system/field boundary	C	Pan-Government Agreement SP6329 12-August-2003	Network of interconnecting ditches, which are most likely to be post-medieval or even 20th century in origin, perhaps as irrigation or drainage ditches associated with the Wind Pump to the north-east. Medieval origin suggested in HER record.
							Network of interconnecting ditches. Appears to have been cut by later possible extractive pit. HER record suggests these cropmarks may be associated with the medieval Priory and moats to the south-east, but may alternatively be more modern in origin.
							Network of interconnecting ditches. Partially coincide with field boundaries on 1982 OS Plan. May be drainage or irrigation ditches

Aerial survey ID	National record of the historic environment reference	HER reference	Period	Type	Evidence	Source	Description
							associated with the Wind Pump. Pump appears on 1958 OS Plan. Ditches are extant on early aerial photographs.
				Field boundary/ boundary bank	E	HS2 LiDAR 2012	Linear bank still extant on 2012 LiDAR. Flanks western side of ditch which shows as a cropmark. Ditch coincides with field boundary marked on 1982 OS Plan. Bank likely to have served as the field boundary.
M09			PM / UN	Extractive pit/quarry	E	HS2 LiDAR 2012	A large slightly oval hollow may be a former extractive pit. Could also be a natural feature, but on wrong geology for dolines and appears to cut cropmarks of a post-medieval or 20th century former field drainage system.
M10			MD / PM	Field boundary/boundary bank	E	HS2 LiDAR 2012	A possible former field boundary bank is visible on LiDAR as an extant linear earthwork. Not recorded on historic OS maps.
M11			PM / UN	Extractive pit/quarry	E	Cambridge University Collection of Aerial Photography RC8HIO35 12-March-1985 / HS2 LiDAR 2012	An area of possible former quarrying is visible as an irregularly-shaped hollow on both aerial photographs of 1985 and the 2012 LiDAR coverage.
M12			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	A small patch of ridge and furrow is visible as earthworks beneath the trees of a small corner of woodland.
							Fairly degraded ridge and furrow is visible on LiDAR as earthworks in an area of trees and scrubland. Cut in places by later tracks and an access road.
							Ridge and furrow is visible as earthworks on LiDAR beneath trees. Cut in places by later drains and tracks.
M13			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	A fragment of ridge and furrow is visible on LiDAR as earthworks beneath the trees of a small area of woodland at the northern end of the nature reserve.
							Ridge and furrow is visible on LiDAR as earthworks beneath the trees of a small area of woodland at the northern end of the nature reserve.
					E / DM	NMR SP 6825-1 CCC 8973-6716 21-October-1929 / HS2 LiDAR 2012	Ridge and furrow which was extant on aerial photographs of 1929 has been destroyed by gravel extraction by the time of the 2012 LiDAR. Now a lake in a nature reserve.
					E / LE	NMR SP 6825-1 CCC 8973-6716 21-October-1929 / HS2 LiDAR 2012	Ridge and furrow which was extant on aerial photographs of 1929 appears to have been levelled by the time of the 2012 LiDAR. Now a nature reserve. May be obscured by spoil from gravel pit excavation to the south (now a lake).
					E / LE / DM	NMR SP 6825-1 CCC 8973-6716 21-October-1929 / HS2 LiDAR 2012	Ridge and furrow is visible on early aerial photographs as extant earthworks. Bisected by railway line. By the time of the 2012 LiDAR the majority had been levelled, and the western edges had been quarried-away (now a nature reserve lake).
M14			MD / PM	Ridge and furrow	E / LE	NMR SP 6825-1 CCC 8973-6716 21-October-1929 / HS2 LiDAR 2012	Ridge and furrow which was extant on aerial photographs of 1929 appears to have been levelled by the time of the 2012 LiDAR. Now a nature reserve. May be obscured by spoil from gravel pit excavation to the south (now a lake).
M15			MD / PM	Ridge and furrow	C	HS2 Hyperspectral 2012 (Run 9a Bands 7, 8, 9) / Pan-Government Agreement SP6825 15-April-2007	Levelled ridge and furrow is visible as faint cropmarks to the south-west of Shepherd's Furze Farm.
							Levelled ridge and furrow is visible as faint cropmarks to the south-west of Shepherd's Furze Farm. Continues across the remainder of the field to the east, but not mapped beyond the project boundary.
					E	HS2 LiDAR 2012	A former field boundary bank or plough headland is visible as a linear bank on the eastern end of a surviving fragment of ridge and furrow.
							Small surviving fragments of ridge and furrow are visible on LiDAR as extant earthworks in a small triangle of land between current and dismantled railway lines.
					E / LE	NMR RAF-CPE-UK-1897 4166 12-December-1946 / HS2 LiDAR 2012	Ridge and furrow which was visible on vertical aerial photographs of 1946 as extant earthworks appears to have been levelled by the time of the 2012 LiDAR.
						NMR RAF-CPE-UK-2139 3235 03-June-1947 / HS2 LiDAR 2012	Ridge and furrow which was visible on vertical aerial photographs of 1947 as extant earthworks appears to have been levelled by the time of the 2012 LiDAR.

Aerial survey ID	National record of the historic environment reference	HER reference	Period	Type	Evidence	Source	Description
						NMR SP 6825-1 CCC 8973-6716 21-October-1929 / HS2 LiDAR 2012	Ridge and furrow which was visible on aerial photographs of 1929 appears to have been levelled by the time of the 2012 LiDAR. Eastern side obliterated by construction of the railway branch line. Appears to overlie an early field boundary to the west.
M16			MD / PM	Ridge and furrow	E / LE	Cambridge University Collection of Aerial Photography RC8HI142 12-March-1985 / HS2 LiDAR 2012	Ridge and furrow that was visible on early aerial photographs as extant earthworks appears to have been levelled by the time of the 2012 LiDAR. Continues to field edge to the south, but not mapped beyond project boundary.
M17			MD / PM	Ridge and furrow	C	Cambridge University Collection of Aerial Photography RC8HH207 06-March-1985	Levelled ridge and furrow is visible as cropmarks on vertical aerial photographs of 1985.
						HS2 Hyperspectral 2012 (Run 14 Bands 7, 8, 9)	Levelled ridge and furrow is visible as cropmarks on hyperspectral imagery in the field to the north of Rose Hill Farm. Continues across the remainder of the field, but not mapped beyond the project boundary.
					E / LE	Cambridge University Collection of Aerial Photography RC8HH207 06-March-1985 / Pan-Government Agreement SP6925 13-April-2010	Ridge and furrow visible on early aerial photographs as extant earthworks appears to have been levelled by the time of 2010 aerial photographs. Continues across remainder of the field to the south, but not mapped beyond the project boundary.
M18			MD / PM	Ridge and furrow	C	Cambridge University Collection of Aerial Photography RC8HH207 06-March-1985	Levelled ridge and furrow is visible as cropmarks on three different ploughing alignments within this narrow modern field.
						Pan-Government Agreement SP7026 15-April-2007	A small area of levelled ridge and furrow is visible on aerial photographs as cropmarks.
					E / LE	Cambridge University Collection of Aerial Photography RC8HH207 06-March-1985 / Pan-Government Agreement SP6925 13-APRIL-2010	Ridge and furrow visible on early aerial photographs as extant earthworks appears to have been levelled by the time of 2010 aerial photographs. Continues across remainder of the field to the north, but not mapped beyond the project boundary.
M19			MD / PM	Ridge and furrow	C	Pan-Government Agreement SP7026 15-April-2007	A small area of levelled ridge and furrow is visible on aerial photographs as cropmarks.
M20			MD / PM	Ridge and furrow	C	Pan-Government Agreement SP6926 24-July-2012	Levelled ridge and furrow is visible on aerial photographs as cropmarks. Continues to the north across the remainder of this field, but not mapped beyond the project boundary.
							Ridge and furrow is visible on aerial photographs as extant earthworks across this small field.
					E	Pan-Government Agreement SP6926 24-July-2012 / HS2 Hyperspectral 2012 (Run 14 Bands 7, 8, 9)	Ridge and furrow is visible as slightly extant earthworks on aerial photographs and hyperspectral imagery of 2012. On two different alignments within this field.
M21			MD / PM	Ridge and furrow	C	Pan-Government Agreement SP6925-6 15-April-2007	Levelled ridge and furrow is visible on aerial photographs as cropmarks.
					E	HS2 LiDAR 2012	Small fragments of surviving ridge and furrow are visible on LiDAR as extant earthworks on the northern and southern side of the Electricity Substation.
M22			MD / PM	Plough headland/field boundary	E	HS2 LiDAR 2012	Ridge and furrow and an associated field boundary or plough headland bank are visible across this field as earthworks on LiDAR.
				Ridge and furrow	C	Pan-Government Agreement SP6925 15-April-2007	Ridge and furrow is visible on LiDAR as extant earthworks across the majority of this field. Levelled on the far western side, where it is visible as faint cropmarks.

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					E	HS2 LiDAR 2012	Ridge and furrow and an associated field boundary or plough headland bank are visible across this field as earthworks on LiDAR.
							Ridge and furrow is visible on LiDAR as extant earthworks across the majority of this field. Levelled on the far western side, where it is visible as faint cropmarks.
M23			MD / PM	Ridge and furrow	C	Cambridge University Collection of Aerial Photography RC8HI142 12-March-1985 / Pan-Government Agreement SP6826 15-April-2007	Levelled ridge and furrow is faintly visible on aerial photographs as cropmarks.
						Pan-Government Agreement SP6826 15-April-2010	Possible levelled ridge and furrow is very faintly visible as cropmarks on vertical aerial photographs of 2010.
						Pan-Government Agreement SP6925 15-APRIL-2007	Levelled ridge and furrow is visible on aerial photographs as cropmarks. Continues to the north across the remainder of the field, but not mapped beyond the project boundary.
					E	HS2 LiDAR 2012	Ridge and furrow is visible on LiDAR as extant earthworks at the southern end of this field. Likely to continue across the remainder of the field to the north, but not mapped beyond the project boundary.
							Ridge and furrow is visible on LiDAR as extant earthworks. There is also evidence of later ploughing perpendicular to the medieval or post-medieval cultivation.
							Ridge and furrow is visible on LiDAR as extant earthworks. Two different directions of ploughing are visible within this narrow strip.
					E / DM	Cambridge University Collection of Aerial Photography RC8HI142 12-March-1985 / Pan-Government Agreement SP6826 15-April-2007	Ridge and furrow visible on early aerial photographs has now been replaced by a farm and several residential properties.
					E / LE	Cambridge University Collection of Aerial Photography RC8HI142 12-March-1985 / HS2 LiDAR 2012	Ridge and furrow that was visible on early aerial photographs as extant earthworks appears to have been levelled by the time of the 2012 LiDAR. Bisected by the railway line. Continues to field edge to the south, but not mapped beyond project boundary.
						Cambridge University Collection of Aerial Photography RC8HI142 12-March-1985 / Pan-Government Agreement SP6826 15-April-2007	Ridge and furrow that was visible on early aerial photographs as extant earthworks appears to have been levelled by the time of the 2012 LiDAR.
M24 (CAL124)			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	A fragment of possible surviving ridge and furrow is visible on LiDAR as earthworks on one side of this small field.
							A fragment of surviving ridge and furrow is visible on LiDAR as earthworks in the corner of this small field.
							Well-preserved ridge and furrow is clearly visible on LiDAR as extant earthworks across this field.
M25			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	Ridge and furrow is visible on LiDAR as extant earthworks at the southern end of this field. Likely to continue across the remainder of the field to the north, but not mapped beyond the project boundary.
M26			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	Ridge and furrow is visible on LiDAR as extant earthworks in the southern corner of this field. Likely to continue across the remainder of the field, but not mapped beyond the project boundary.
M27			MD / PM	Ridge and furrow	C	HS2 Hyperspectral 2012 (Run 10b Bands 7, 8, 9)	Levelled ridge and furrow is visible as cropmarks on hyperspectral imagery of 2012. Two different alignments of ridge and furrow are visible within this single large modern field.
							Levelled ridge and furrow is visible on hyperspectral imagery of 2012 as cropmarks. Extends across the remainder of the field, but not mapped beyond the project boundary.
						Pan-Government Agreement	Clearly visible on aerial photographs as cropmarks. Bisected by the partially remaining embankment for the dismantled railway

Aerial survey ID	National record of the historic environment reference	HER reference	Period	Type	Evidence	Source	Description
						SP6725-6 15-April-2007	line. In the centre, where the embankment has been more fully removed, ridge and furrow cropmarks are visible.
							Levelled ridge and furrow is faintly visible on aerial photographs as cropmarks. Bisected by the partially remaining embankment for the dismantled railway line.
							Levelled ridge and furrow is visible on aerial photographs as cropmarks. Continues across the rest of this field to the west, but not mapped beyond the project boundary.
							Levelled ridge and furrow is visible on aerial photographs as cropmarks across this field.
					E	HS2 LiDAR 2012	A fragment of surviving ridge and furrow is visible on LiDAR as earthworks in the south-western corner of this field.
							Very well-preserved ridge and furrow is visible on LiDAR on the remaining un-developed areas of this field.
							Well-preserved ridge and furrow is visible on LiDAR as extant earthworks. Worn patch in the centre where a track leads across the field to the farm to the west.
					E / DM	Pan-Government Agreement SP6726 15-April-2007 / HS2 LiDAR 2012	Well-preserved ridge and furrow was visible on aerial photographs of 2007 as extant earthworks. By the time of the 2012 LiDAR a house and several farm buildings had been constructed across more than half of the field.
					E / LE	NMR RAF-CPE-UK-1897 4164 12-December-1946 / HS2 LiDAR 2012	Ridge and furrow which was visible on vertical aerial photographs of 1946 as extant earthworks appears to have been levelled by the time of the 2012 LiDAR.
M28			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	Extant ridge and furrow is visible on LiDAR. Overlain by the embankment for a bridge over the now disused railway line to the south-west.
							Very well-preserved extant ridge and furrow is clearly visible on LiDAR. North-eastern corner cut by railway line. The fragment beyond the railway line is slightly less well-preserved than the rest of it.
							Very well-preserved ridge and furrow is clearly visible on LiDAR. Cut on the western side by a modern field boundary, and on the eastern side by the railway line.
							Very well-preserved ridge and furrow is clearly visible on LiDAR. Later drains (marked on modern OS map) have cut this area into three chunks. Continues to the south-west, but not mapped beyond the project boundary.
							Well-preserved ridge and furrow is visible on LiDAR as extant earthworks. Bisected by the now disused railway line. Less well-preserved on the northern side. Southern side overlain in north-east corner by the embankment for a bridge over the railway.
M29			MD / PM	Ridge and furrow	C	Pan-Government Agreement SP6726 15-April-2007	Levelled ridge and furrow is faintly visible as earthworks across this field.
					E	HS2 LiDAR 2012	Extant ridge and furrow is visible on LiDAR. Overlain by the embankment for a bridge over the now disused railway line to the south-west.
							Ridge and furrow is visible on LiDAR as extant earthworks.
							Well-preserved ridge and furrow is visible on LiDAR as extant earthworks. Bisected by the now disused railway line. Less well-preserved on the northern side. Southern side overlain in north-east corner by the embankment for a bridge over the railway.
					E / LE	Cambridge University Collection of Aerial Photography RC8HI103 12-March-1985 / HS2 LiDAR 2012	Ridge and furrow that was visible on early aerial photographs as extant earthworks appears to have been levelled by the time of the 2012 LiDAR.
						NMR RAF-CPE-UK-2097 3078 28-May-1947 / HS2 LiDAR 2012	Ridge and furrow that was visible on early aerial photographs as extant earthworks appears to have been levelled by the time of the 2012 LiDAR.

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M30 (CAL125)		0635100000	MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	Extant ridge and furrow is visible on LiDAR as earthworks on the south-western side of this field.
							Extant ridge and furrow is visible on LiDAR in the corner of this field. Likely to have continued across the remainder of the field to the north, but not mapped beyond the project boundary.
							Very faintly extant ridge and furrow is just visible on LiDAR as earthworks. Less well-preserved than the other blocks of ridge and furrow on different alignments in this field.
					E / LE	Pan-Government Agreement SP6726 15-April-2007 / HS2 LiDAR 2012	Very faintly extant ridge and furrow is just visible on LiDAR as earthworks. Less well-preserved than the other blocks of ridge and furrow on different alignments in this field.
M31 (CAL053)			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	Extant ridge and furrow is visible as earthworks across this triangular field. Not as well-preserved as some of the other nearby examples; but clearly visible nonetheless.
							Extant ridge and furrow is visible as earthworks on LiDAR. Not as well-preserved as the field to the north-east.
						HS2 Vertical Photography SP6626 2012	Ridge and furrow is visible on vertical aerial photographs of 2012 as extant earthworks. Area of probable modern disturbance in the south-western corner of this field.
M32			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	Ridge and furrow is visible on LiDAR as extant earthworks. Likely to continue across the remainder of the field to the south, but not mapped beyond the project boundary.
M33			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	A fragment of surviving ridge and furrow is visible on LiDAR in the northern corner of this field.
M34			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	Extant ridge and furrow is visible on LiDAR as earthworks in the field to the north-west of Church View Farm.
M35			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	A possible fragment of ridge and furrow is visible as faint earthworks on the low-lying ground beside the river.
M36		0635100000	MD / PM	Ridge and furrow	C	HS2 Vertical Photography SP6527 2012	Levelled ridge and furrow is visible as cropmarks across this field. Likely to continue to the north-east across the remainder of the field, but not mapped beyond the boundary of the study area.
					E	HS2 LiDAR 2012	A fragment of quite well-preserved ridge and furrow is visible on LiDAR as earthworks in a small field on the southern side of Cowley Old House.
							A fragment of ridge and furrow is visible as well-preserved extant earthworks on LiDAR.
							Ridge and furrow is faintly visible as extant earthworks on 2012 LiDAR.
							Ridge and furrow is visible on LiDAR as faintly extant earthworks. Continues to north-east, but not mapped beyond the boundary of the study area. Bisected by what appears to be a hollow way or drainage ditch leading to the pond.
							Very faintly extant LiDAR is just visible on 2012 LiDAR. Almost completely plough-levelled.
							Very well-preserved ridge and furrow is visible on LiDAR as extant earthworks. Visible on two different alignments within this field; divided by a possible plough headland or field boundary bank.
						Pan-Government Agreement SP6627 15-April-2007 / HS2 LiDAR 2012	Ridge and furrow is visible across this field as cropmarks. 2012 LiDAR shows it is still faintly extant.
					E / LE	NMR RAF-CPE-UK-1897 3163 12-December-1946 / HS2 LiDAR 2012	Ridge and furrow which was visible on vertical aerial photographs of 1946 as extant earthworks appears to have been levelled by the time of the 2012 LiDAR.
					E / LE	Pan-Government Agreement SP6627 15-April-2007 / HS2 LiDAR 2012	Ridge and furrow which appeared to be extant on the vertical aerial photographs of 2007 seem to have been levelled by the time of the 2012 LiDAR.

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M37			MD / PM	Hollow way/drainage ditch	E	HS2 LiDAR 2012	Possible hollow way leading to the pond to the east. Appears to cut ridge and furrow. May be roughly contemporary, or may in fact be a later drainage ditch.
M38 (CAL062)		0635100000	MD / PM	Plough headland/field boundary	E	HS2 LiDAR 2012	Ridge and furrow and associated plough headlands or field boundary banks are clearly visible on LiDAR as well-preserved earthworks.
				Ridge and furrow	E	HS2 LiDAR 2012	Ridge and furrow and associated plough headlands or field boundary banks are clearly visible on LiDAR as well-preserved earthworks.
							Ridge and furrow and associated plough headlands or field boundary banks are clearly visible on LiDAR as well-preserved earthworks.
					E / LE	NMR RAF-CPE-UK-1897 3163 12-December-1946 / HS2 LiDAR 2012	Ridge and furrow which was visible on vertical aerial photographs of 1946 as extant earthworks appears to have been levelled by the time of the 2012 LiDAR.
M39		0635100000	MD / PM	Ridge and furrow	C	Pan-Government Agreement SP6527 01-September-2004	Levelled ridge and furrow is visible as cropmarks on LiDAR. Likely continuation of the field to the north; cut by later railway line.
					E	Pan-Government Agreement SP6527 01- September -2004 / HS2 LiDAR 2012	Ridge and furrow is clearly visible on aerial photographs as cropmarks. LiDAR coverage of 2012 shows there is still some height to the ridges. Almost levelled.
M40		0635100000	MD / PM	Field boundary/boundary bank	E	HS2 LiDAR 2012	Levelled ridge and furrow is visible on vertical aerial photographs of 2004 as cropmarks. LiDAR of 2012 shows the former field boundary bank between the two areas of ridge and furrow is still faintly extant.
				Plough headland/field boundary	E	HS2 LiDAR 2012	Very well-preserved ridge and furrow is visible on LiDAR as extant earthworks. Visible on two different alignments within this field; divided by a possible plough headland or field boundary bank.
				Ridge and furrow	C	HS2 Hyperspectral 2012 (Run 10b Bands 4, 5, 6)	Levelled ridge and furrow is faintly visible on hyperspectral imagery as cropmarks. Three different ploughing directions are visible within this single large modern field.
						HS2 Vertical Photography SP6527 2012	Levelled ridge and furrow is faintly visible as cropmarks on vertical aerial photographs of 2012.
						Pan-Government Agreement SP6527 01- September -2004	Levelled ridge and furrow is visible as cropmarks in the south-western end of this field. Likely to continue across the rest of the field to the north-east, but not mapped beyond the boundary of the study area.
							Levelled ridge and furrow is visible on vertical aerial photographs of 2004 as cropmarks. LiDAR of 2012 shows the former field boundary bank between the two areas of ridge and furrow is still faintly extant.
							Ridge and furrow is faintly visible as cropmarks on aerial photographs of 2004. Bisected by the railway line. The continuation to the south-west of the railway line is still faintly extant.
						Pan-Government Agreement SP6527 24-July-2012	Levelled ridge and furrow is faintly visible as cropmarks on vertical aerial photographs of 2012 across this entire large field.
					E	HS2 LiDAR 2012	Very well-preserved ridge and furrow is visible on LiDAR as extant earthworks. Visible on two different alignments within this field; divided by a possible plough headland or field boundary bank.
M41		0635100000	MD / PM	Ridge and furrow	C	Pan-Government Agreement SP6527 01- September -2004	Levelled ridge and furrow is very faintly visible as cropmarks in two different directions across this field. Continues to the north-east, but not mapped beyond the edge of the study area.
					E	Pan-Government Agreement SP6527 24-July-2012 / HS2 LiDAR 2012	Ridge and furrow is very clearly visible as earthworks on aerial photographs of 2012. LiDAR of the same year shows that there is still some height to the ridges. Almost completely levelled though. Continues to the north-east, but not mapped there.

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M42			MD / PM	Ridge and furrow	E / LE	Cambridge University Collection of Aerial Photography RC8HI075 12-March-1985 / HS2 LiDAR 2012	Ridge and furrow which was visible on vertical aerial photographs of 1985 as extant earthworks appears to have been levelled by the time of the 2012 LiDAR. It may alternatively have been masked with alluvium from flooding of the Padbury Brook.
M43			MD / PM	Ridge and furrow	C	Cambridge University Collection of Aerial Photography RC8HI075 12-March-1985	Levelled ridge and furrow is visible as cropmarks on several different alignments across what is now a large open area.
					E / LE	NMR RAF-541-340 3179 26-July-1949 / HS2 LiDAR 2012	Ridge and furrow which was visible on vertical aerial photographs of 1949 as extant earthworks appears to have been levelled by the time of the 2012 LiDAR.
M44			MD / PM	Ridge and furrow	C	Pan-Government Agreement SP6428 01- September -2004	Levelled ridge and furrow is visible as cropmarks across this field.
					E / DM	NMR RAF-3G-TUD-UK-86 6149 26-March-1946 / HS2 LiDAR 2012	Ridge and furrow that was visible on early aerial photographs as extant earthworks has been destroyed by the time of the 2012 LiDAR by the creation of a lake.
					E / LE	NMR RAF-3G-TUD-UK-86 6149 26-March-1946 / HS2 LiDAR 2012	Ridge and furrow that was visible on early aerial photographs as extant earthworks appears to have been levelled by the time of the 2012 LiDAR.
M45			MD / PM	Ridge and furrow	C	Pan-Government Agreement SP6428 01-SEPTEMBERT-2004	Levelled ridge and furrow is visible as cropmarks across this field.
						Pan-Government Agreement SP6428 01-SEPTEMBERT-2004 / HS2 Vertical Photography SP6428 2012	Levelled ridge and furrow is visible on aerial photographs as cropMarchks on two different alignments across this single large modern field.
					E / LE	NMR RAF-3G-TUD-UK-86 6149 26-March-1946 / HS2 LiDAR 2012	Ridge and furrow that was visible on early aerial photographs as extant earthworks appears to have been levelled by the time of the 2012 LiDAR.
							Ridge and furrow that was visible on early aerial photographs as extant earthworks appears to have been levelled by the time of the 2012 LiDAR.
M46			MD / PM	Ridge and furrow	C	Pan-Government Agreement SP6429 12-August-2003	Levelled ridge and furrow is visible on aerial photographs as cropmarks. Continues across the remainder of the field to thenorth-east, but not mapped beyond the boundary of the study area.
					E	HS2 LiDAR 2012	Ridge and furrow is just visible on LiDAR as faintly extant earthworks beneath the trees of a small area of woodland.
							Ridge and furrow is visible on LiDAR as extant earthworks within this small corner field.
					E / LE	NMR RAF-541-340 3179 26-July-1949 / HS2 LiDAR 2012	Ridge and furrow that was visible on early aerial photographs as extant earthworks appears to have been levelled by the time of the 2012 LiDAR.
M47			MD / PM	Ridge and furrow	C	Pan-Government Agreement SP6429 12-August-2003	Levelled ridge and furrow is clearly visible on aerial photographs as cropmarks.
					E / LE	NMR RAF-3G-TUD-UK-86 6149 26-March-1946 / HS2 LiDAR 2012	Ridge and furrow that appeared to be extant on vertical aerial photographs of 1946 seems to have been levelled by the time of the 2012 LiDAR.
M48			MD / PM	Ridge and furrow	C	Pan-Government Agreement SP6329 02-June-2009	Levelled ridge and furrow is just visible on vertical aerial photographs as faint cropmarks. A continuation of the earthworks visible on LiDAR in the field to the south-west.

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							Levelled ridge and furrow is visible on aerial photographs as cropmarks across this field.
					E	HS2 LiDAR 2012	Ridge and furrow is just visible on LiDAR as faintly extant earthworks. Likely to continue across the rest of the field to the south-west, but not mapped beyond the boundary of the study area.
							Very well-preserved ridge and furrow is clearly visible as earthworks on LiDAR. Likely to continue across the remainder of the field to the west, but not mapped beyond the edge of the study area.
					E / LE	NMR RAF-106G-UK-1380 3027 09-April-1946 / HS2 LiDAR 2012	Ridge and furrow which was visible on vertical aerial photographs of 1946 as extant earthworks appears to have been levelled by the time of the 2012 LiDAR.
M49			MD / PM	Ridge and furrow	C	Pan-Government Agreement SP6329 02-Junr-2009	Levelled ridge and furrow is clearly visible on aerial photographs as cropmarks. A continuation of the cropmarks on the other side of the disused railway line.
					E	HS2 LiDAR 2012	Almost levelled ridge and furrow is just visible on LiDAR as extremely faint earthworks. A continuation from the field to the south-west.
					E / LE	NMR RAF-106G-UK-1380 3027 09-April-1946 / HS2 LiDAR 2012	Ridge and furrow which was visible on vertical aerial photographs of 1946 as extant earthworks appears to have been levelled by the time of the 2012 LiDAR.
						NMR RAF-3G-TUD-UK-86 6149 26-March-1946 / HS2 LiDAR 2012	Ridge and furrow that appeared to be extant on vertical aerial photographs of 1946 seems to have been levelled by the time of the 2012 LiDAR.
M50 (CAL092)			MD / PM	Plough headland	E	HS2 LiDAR 2012	Very well-preserved ridge and furrow is visible as extant earthworks on LiDAR, in the small field to the east of The Hermitage. The associated plough headland is also still extant.
				Ridge and furrow	E	HS2 LiDAR 2012	Very well-preserved ridge and furrow is visible as extant earthworks on LiDAR, in the small field to the east of The Hermitage. The associated plough headland is also still extant.
M51			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	Possible ridge and furrow is visible in the south-western corner of this field. Remains of the nearby possibly contemporary fishponds and moats not mapped as they have already been adequately recorded on modern and historic OS maps.
M52			MD / PM	Ridge and furrow	E	HS2 LiDAR 2012	Possible ridge and furrow is visible between Priory House and the medieval fishpond. Remains of the nearby possibly contemporary fishponds and moats not mapped as they have already been adequately recorded on modern and historic OS maps.
M53			MD / PM	Ridge and furrow	C C	Pan-Government Agreement SP6329 12-August-2003	Levelled ridge and furrow is clearly visible on vertical aerial photographs of 2003 as cropmarks.
						Pan-Government Agreement SP6329 12-August-2003	Levelled ridge and furrow is visible on vertical aerial photographs of 2003 as cropmarks.
					E	HS2 LiDAR 2012	Almost completely levelled ridge and furrow is just visible as earthworks on LiDAR coverage of 2012.
					E / LE	NMR RAF-106G-UK-1380 3027 09-April-1946 / HS2 LiDAR 2012	Ridge and furrow which was visible on vertical aerial photographs of 1946 as extant earthworks appears to have been levelled by the time of the 2012 LiDAR.
						NMR RAF-CPE-UK-2008 4011 16-April-1947 / HS2 LiDAR 2012	Ridge and furrow which was visible on vertical aerial photographs of 1947 as extant earthworks appears to have been levelled by the time of the 2012 LiDAR.
M54			MD / PM	Ridge and furrow	C	Pan-Government Agreement SP6329 12-August-2003	Levelled ridge and furrow is clearly visible on vertical aerial photographs of 2003 as cropmarks. Continues across the remainder of the field to the south-west, but not mapped beyond the boundary of the study area.
							Levelled ridge and furrow is strongly visible as cropmarks on vertical aerial photographs of 2003. Continues across the remainder of the field to the south-west, but not mapped beyond the boundary of the study area.
					E	HS2 LiDAR 2012	Almost completely levelled ridge and furrow is just visible as earthworks on LiDAR coverage of 2012.
							Extant ridge and furrow is clearly visible as well-preserved earthworks within the garden or small paddock on the north-east side of

Aerial survey ID	National record of the historic environment reference	HER reference	Period	Type	Evidence	Source	Description
							Barton Hill Farm.
							Well-preserved ridge and furrow is visible as extant earthworks on 2012 LiDAR.
					E / DM	NMR RAF-106G-UK-1380 3027 09-April-1946 / HS2 LiDAR 2012	Ridge and furrow which was visible on vertical aerial photographs of 1946 as extant earthworks have been later destroyed by the excavation of a pond in this corner of the field.
M55			MD / PM	Ridge and furrow	C	HS2 Hyperspectral 2012 (Run 18 Bands 20, 21, 22)	Levelled ridge and furrow is visible on hyperspectral imagery as cropmarks.
					E	HS2 LiDAR 2012	Almost completely levelled ridge and furrow is just visible as earthworks on LiDAR coverage of 2012.
							Ridge and furrow is just visible as extant earthworks on LiDAR coverage of 2012.
M56			MD / PM	Ridge and furrow	C	HS2 Hyperspectral 2012 (Run 17 Bands 20, 21, 22)	Levelled ridge and furrow is visible on hyperspectral imagery as a narrow strip of cropmarks on the north-west side of this field.
						Pan-Government Agreement SP6330 02-June-2009	Levelled ridge and furrow is visible on aerial photographs as cropmarks. Very strongly visible in the northern half of the field. Only just visible in the southern half of the field.
					E	HS2 LiDAR 2012	Almost completely levelled ridge and furrow is just visible as earthworks on LiDAR coverage of 2012.
							Ridge and furrow is clearly visible as extant earthworks on LiDAR coverage of 2012.
							Ridge and furrow is just visible as extant earthworks on LiDAR coverage of 2012.
							Well-preserved ridge and furrow is visible on LiDAR as extant earthworks. Two different directions of ploughing are visible within this one large modern field.
					E / LE	NMR RAF-106G-UK-1380 3028 09-April-1946 / HS2 LiDAR 2012	Ridge and furrow which was visible on vertical aerial photographs of 1946 as extant earthworks appears to have been levelled by the time of the 2012 LiDAR.
M57			MD / PM	Ridge and furrow	C	Cambridge University Collection of Aerial Photography RC8HIO35 12-March-1985	Levelled ridge and furrow is visible as cropmarks on vertical aerial photographs of 1985. Continues across the rest of the field, but not mapped beyond the boundary of the study area.
M58 (CAL119)			MD	Field boundary/boundary bank	E	HS2 LiDAR 2012	A possible former field boundary bank is visible as a long linear earthwork on LiDAR. It appears to be cut by medieval or post-medieval ridge and furrow, though as those earthworks are so slight it is difficult to be certain.
M59			MD / PM	Field boundary/boundary bank	E	HS2 LiDAR 2012	A possible former field boundary bank is visible as a slightly curved linear bank. Not clear why this would be immediately adjacent to a plough headland. Originates from the bend in the road, so may represent an earlier course of the road.

2.6 Results: interpretation

2.6.1 A total of 59 possible archaeological features were recorded from the remote sensed imagery that was surveyed as part of this project.

2.6.2 There were no scheduled monuments within the study area.

2.6.3 The identified features are all likely to originate from the medieval or post-medieval periods and relate mostly to agriculture (predominately ridge and furrow cultivation and former field boundaries).

2.6.4 The complex of medieval features which constitute the former Chetwode Priory, including three moated sites and a fishpond, were not mapped as part of this survey (national record of the historic environment: 341027, HER: 0031900000, 0038200000, 0038300000, 0057700000). Although the earthwork remains of these features were clearly visible on the remote sensed imagery no additional detail was observed which hadn't already been recorded on either the modern or historic OS maps. It was therefore beyond the scope of this survey, as noted in Section 2.2, to transcribe these earthworks.

2.6.5 The survey recorded the earthwork remains of shrunken or shifted settlement (M04, CAL051, CAL054) around the northern end of Twyford. These features are likely to be medieval in date and include:

- trackways and several lengths of wide hollow way;
- linear and rectilinear ditches and banks which may represent toft and croft remains; and
- several ponds, some of which have been suggested by the HER to have been fishponds.

2.6.6 Approximately half of these features lie outside of the polygons indicating the area of former medieval settlement as defined by the Buckinghamshire HER, particularly those in the Church View Farm area.

2.6.7 The survey recorded prolific evidence of both extant and levelled ridge and furrow cultivation which is likely to date from the medieval or early post-medieval periods. Some of the extant earthworks appear to be very well-preserved. The only significant gaps in the near-contiguous coverage of ridge and furrow were attributable to:

- areas of alluvial deposit, such as around Padbury Brook where it passes near both Godington and Twyford. It is possible that surviving ridge and furrow or other archaeological remains have been masked by the presence of the alluvium; and
- areas of former gravel extraction on the north-western and south-eastern sides of Calvert. The earliest available aerial photographs of 1929 show extant ridge and furrow across the then few still remaining fields in this area (M13) prior to its destruction.

2.6.8 The survey also recorded the earthwork remains of a number of former field boundaries and possible plough headlands. Most of these are likely to be medieval or post-medieval in date. As noted in Section 2.2, former field boundaries already recorded on historic OS maps were not transcribed here.

2.6.9 The survey noted the presence of a mound (M05) in the same field as a windmill mound recorded in both the national record of the historic environment and HER (341018 and 0023800000 respectively) and within the gazetteer of heritage assets (Volume 5: CH-002-013, CAL067). The recorded example lies beyond the boundary of the study area. Although the mound mapped as part of this survey may have a later agricultural origin, it is also possible that this is another disused medieval or post-medieval windmill mound. The ditch surrounding the mound appears to cut the earlier ridge and furrow still extant within this field (M40).

2.6.10 A well-preserved duck decoy pond (M02, CAL002) was visible on LiDAR through the trees of Decoypond Wood, at the south-eastern end of CFA13. This feature is likely to date from the post-medieval period. It is enclosed by an octagonal ditch linked to a network of other channels which may have played a part in either supplying or draining water away from the main pond. It is possible some of these may post-date the period of use of the duck pond. The pond has not been recorded on the 1st to 4th edition OS maps.

2.6.11 Linear and rectilinear ditch cropmarks on the north-western side of Chetwode were visible on a range of the remote sensed sources (M08, CAL118). It is thought that these are post-medieval or 20th century in date as they coincide with several of the field boundaries recorded on the 1982 OS plan. The HER record for this site notes that they may have origins associated with the medieval priory. The wind pump in the north-eastern corner of this field is noted from the OS plan of 1958 onwards. These ditches may therefore have been used for drainage or irrigation powered by this pump.

2.7 Conclusions

2.7.1 Fifty-nine individual or grouped possible archaeological features were identified by the survey, 49 of which are not recorded by either the HER or national record of the historic environment. These features include:

- the earthwork remains of an area of medieval shrunken or shifted settlement around the northern end of Twyford (CAL051, CAL054);
- near contiguous evidence for ridge and furrow cultivation, both as extant and levelled earthworks;
- medieval and post-medieval field boundary earthworks;
- a possible previously unrecorded medieval or post-medieval windmill mound;
- a well-preserved post-medieval duck decoy pond; and
- a series of linear and rectilinear ditch cropmarks on the north-western side of Chetwode which are most likely to represent the remains of post-medieval or modern field boundaries or drainage/irrigation.

2.7.2 There were no scheduled monuments within the CFA13 study area.

2.8 References

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2.8.1 Winton, H.,(2012), *Standards for National Mapping Programme projects*, Version 0.1 Draft, English Heritage, Aerial Investigation and Mapping, Typescript document.

2.9 Historic aerial photographs consulted

Table 5: English Heritage vertical aerial photographs consulted for the remote sensing survey of CFA13

English Heritage library number	Original sortie number	Original frame number	Date taken
212	RAF/3G/TUD/UK/86	6149	26 March 1946
212	RAF/3G/TUD/UK/86	6185	26 March 1946
212	RAF/3G/TUD/UK/86	6186	26 March 1946
562	RAF/CPE/UK/1897	3163	12 December 1946
562	RAF/CPE/UK/1897	3164	12 December 1946
562	RAF/CPE/UK/1897	3165	12 December 1946
562	RAF/CPE/UK/1897	4164	12 December 1946
562	RAF/CPE/UK/1897	4165	12 December 1946
562	RAF/CPE/UK/1897	4166	12 December 1946
601	RAF/CPE/UK/2008	4011	16 April 1947
601	RAF/CPE/UK/2008	4012	16 April 1947
601	RAF/CPE/UK/2008	4013	16 April 1947
603	RAF/CPE/UK/2013	4012	16 April 1947
603	RAF/CPE/UK/2013	4013	16 April 1947
603	RAF/CPE/UK/2013	4014	16 April 1947
603	RAF/CPE/UK/2013	4015	16 April 1947
603	RAF/CPE/UK/2013	4016	16 April 1947
603	RAF/CPE/UK/2013	4017	16 April 1947
603	RAF/CPE/UK/2013	4018	16 April 1947
603	RAF/CPE/UK/2013	4019	16 April 1947
652	RAF/CPE/UK/2097	3076	28 May 1947
652	RAF/CPE/UK/2097	3077	28 May 1947
652	RAF/CPE/UK/2097	3078	28 May 1947
652	RAF/CPE/UK/2097	3079	28 May 1947
652	RAF/CPE/UK/2097	3148	28 May 1947
652	RAF/CPE/UK/2097	3149	28 May 1947
652	RAF/CPE/UK/2097	3150	28 May 1947
663	RAF/CPE/UK/2139	3233	03 June 1947
663	RAF/CPE/UK/2139	3234	03 June 1947
663	RAF/CPE/UK/2139	4234	03 June 1947
663	RAF/CPE/UK/2139	4235	03 June 1947
663	RAF/CPE/UK/2139	4236	03 June 1947
680	RAF/CPE/UK/2159	3064	13 June 1947
680	RAF/CPE/UK/2159	3065	13 June 1947
680	RAF/CPE/UK/2159	3066	13 June 1947
680	RAF/CPE/UK/2159	3067	13 June 1947
680	RAF/CPE/UK/2159	3138	13 June 1947
680	RAF/CPE/UK/2159	3139	13 June 1947
680	RAF/CPE/UK/2159	3140	13 June 1947

English Heritage library number	Original sortie number	Original frame number	Date taken
680	RAF/CPE/UK/2159	3141	13 June 1947
680	RAF/CPE/UK/2159	4066	13 June 1947
680	RAF/CPE/UK/2159	4067	13 June 1947
680	RAF/CPE/UK/2159	4068	13 June 1947
680	RAF/CPE/UK/2159	4068	13 June 1947
680	RAF/CPE/UK/2159	4069	13 June 1947
680	RAF/CPE/UK/2159	4069	13 June 1947
680	RAF/CPE/UK/2159	4070	13 June 1947
680	RAF/CPE/UK/2159	4140	13 June 1947
2114	RAF/543/673	23	24 August1959
2114	RAF/543/673	24	24 August1959
2114	RAF/543/673	24	24 August1959
2114	RAF/543/673	25	24 August1959
2195	RAF/58/4627	370	16 August 1961
2195	RAF/58/4627	371	16 August 1961
2195	RAF/58/4627	374	16 August 1961
2195	RAF/58/4627	375	16 August 1961
2195	RAF/58/4627	376	16 August 1961
2204	RAF/58/4646	210	28 August 1961
2204	RAF/58/4646	211	28 August 1961
2204	RAF/58/4646	218	28 August 1961
2204	RAF/58/4646	219	28 August 1961
2213	RAF/543/1426	343	28 August 1961
2213	RAF/543/1426	344	28 August 1961
2213	RAF/543/1426	345	28 August 1961
2661	RAF/541/340	3148	26 July 1949
2661	RAF/541/340	3149	26 July 1949
2661	RAF/541/340	3169	26 July 1949
2661	RAF/541/340	3170	26 July 1949
2661	RAF/541/340	3170	26 July 1949
2661	RAF/541/340	3171	26 July 1949
2661	RAF/541/340	3172	26 July 1949

English Heritage library number	Original sortie number	Original frame number	Date taken
2661	RAF/541/340	3179	26 July 1949
2661	RAF/541/340	3180	26 July 1949
2661	RAF/541/340	3181	26 July 1949
2661	RAF/541/340	3252	26 July 1949
2661	RAF/541/340	3253	26 July 1949
3350	RAF/106G/UK/1380	3026	09 April 1946
3350	RAF/106G/UK/1380	3027	09 April 1946
3350	RAF/106G/UK/1380	3028	09 April 1946
3518	RAF/58/780	5127	14 September1951
3518	RAF/58/780	5128	14 September1951
3518	RAF/58/780	5129	14 September1951
3518	RAF/58/780	5130	14 September1951
3518	RAF/58/780	5149	14 September1951
3518	RAF/58/780	5150	14 September1951
3518	RAF/58/780	5151	14 September1951
3518	RAF/58/780	5152	14 September1951
3518	RAF/58/780	5153	14 September1951
9902	OS/76044	245	29 April 1976
9902	OS/76044	312	29 April 1976
9902	OS/76044	313	29 April 1976
10419	OS/73252	93	06 June 1973
10419	OS/73252	94	06 June 1973
10419	OS/73252	95	06 June 1973
10420	OS/73274	34	06 June 1973
10420	OS/73274	35	06 June 1973
10420	OS/73274	36	06 June 1973
10420	OS/73274	37	06 June 1973
10421	OS/73283	791	14 June 1973
10421	OS/73283	792	14 June 1973
10421	OS/73283	793	14 June 1973
10421	OS/73283	794	14 June 1973
10421	OS/73283	795	14 June 1973

English Heritage library number	Original sortie number	Original frame number	Date taken
10422	OS/73284	193	14 June 1973
10422	OS/73284	194	14 June 1973
10422	OS/73284	195	14 June 1973
10422	OS/73284	274	14 June 1973
10422	OS/73284	275	14 June 1973
10422	OS/73284	276	14 June 1973
10422	OS/73284	277	14 June 1973
10422	OS/73284	303	14 June 1973
10422	OS/73284	304	14 June 1973
14521	OS/93561B	245	19 September 1993
14521	OS/93561B	303	19 September 1993
14521	OS/93561B	304	19 September 1993
14521	OS/93561B	305	19 September 1993
1118A	FSL/6125	14001	1961
1118A	FSL/6125	14002	1961
1118A	FSL/6125	14003	1961
1118A	FSL/6125	14004	1961
1118A	FSL/6125	14098	1961
1118A	FSL/6125	14099	1961
1118A	FSL/6125	14100	1961
1118A	FSL/6125	19042	1961
1118A	FSL/6125	19043	1961

Table 6: Table 6: English Heritage oblique aerial photographs consulted for the remote sensing survey of CFA13

English Heritage photo reference	Film number	Original frame number	Date taken
SP 6230 / 01	NHC 2508	/ 03	24 July 1984
SP 6329 / 01	NMR 15155	/ 01	29 July1994
SP 6329 / 02	NMR 15155	/ 02	29 July 1994
SP 6329 / 03	NMR 15155	/ 03	29 July 1994
SP 6329 / 04	NMR 15161	/ 33	28 July 1994
SP 6329 / 05	NMR 15161	/ 34	28 July 1994
SP 6329 / 06	NMR 15161	/ 35	28 July 1994
SP 6329 / 07	NMR 15161	/ 36	28 July 1994
SP 6330 / 01	NMR 26952	/ 39	04 May 2011
SP 6331 / 01	NMR 4655	/ 19	21 July 1990
SP 6331 / 02	NHC 11929	/ 11	11 July 1990
SP 6331 / 03	NHC 11929	/ 12	11 July 1990
SP 6331 / 04	NMR 18926	/ 26	14 November 2000
SP 6331 / 05	NMR 18926	/ 27	14 November 2000
SP 6331 / 06	NMR 21058	/ 13	14 November 2000
SP 6331 / 07	NMR 23660	/ 27	29 July 2004
SP 6331 / 08	NMR 23660	/ 28	29 July 2004
SP 6331 / 09	NMR 23660	/ 29	29 July 2004
SP 6331 / 10	NMR 23660	/ 30	29 July 2004
SP 6331 / 11	NMR 23678	/ 08	29 July 2004
SP 6331 / 12	NMR 23678	/ 09	29 July 2004
SP 6331 / 13	NMR 23678	/ 10	29 July 2004
SP 6427 / 01	CAP 8117	/ 25	03 May 1953
SP 6427 / 02	CAP 8117	/ 26	03 May 1953
SP 6427 / 03	CAP 8117	/ 27	03 May 1953
SP 6427 / 04	CAP 8117	/ 28	03 May 1953
SP 6427 / 05	CAP 8117	/ 29	03 May 1953
SP 6427 / 06	CAP 8117	/ 30	03 May 1953
SP 6427 / 13	NMR 18614	/ 10	16 November 1999
SP 6427 / 14	NMR 18614	/ 11	16 November 1999
SP 6427 / 15	NMR 18556	/ 09	16 November 1999
SP 6427 / 16	NMR 18556	/ 10	16 November 1999
SP 6427 / 17	NMR 18556	/ 11	16 November 1999
SP 6428 / 01	NMR 4655	/ 18	16 November 1999
SP 6428 / 02	NMR 18541	/ 25	16 November 1999
SP 6428 / 03	NMR 18541	/ 26	16 November 1999
SP 6428 / 04	NMR 18614	/ 12	16 November 1999
SP 6428 / 05	NMR 18614	/ 13	16 November 1999

English Heritage photo reference	Film number	Original frame number	Date taken
SP 6428 / 06	NMR 18614	/ 14	16 November 1999
SP 6430 / 01	NMR 4655	/ 20	21 July 1990
SP 6527 / 01	CCC 8956	/ 6717	21 October 1929
SP 6626 / 01	NMR 26953	/ 02	04 May 2011
SP 6626 / 02	NMR 26953	/ 03	04 May 2011
SP 6626 / 03	NMR 26953	/ 04	04 May 2011
SP 6626 / 04	NMR 26953	/ 05	04 May 2011
SP 6626 / 05	NMR 26953	/ 06	04 May 2011
SP 6626 / 06	NMR 26953	/ 07	04 May 2011
SP 6725 / 01	NMR 26953	/ 01	04 May 2011
SP 6825 / 01	CCC 8973	/ 6716	24 March 1930

Table 7: Cambridge University Collection of Aerial Photography aerial photographs consulted for the remote sensing survey of CFA13

Cambridge University Collection of Aerial Photography catalogue number	Date taken	Type
ACR9	17/04/1961	Oblique
ACR10	17/04/1961	Oblique
AFL74	14/06/1962	Oblique
AFL75	14/06/1962	Oblique
BV67	25/07/1948	Oblique
BV68	25/07/1948	Oblique
LU25	03/05/1993	Oblique
LU26	03/05/1993	Oblique
LU27	03/05/1993	Oblique
LU28	03/05/1993	Oblique
LU29	03/05/1993	Oblique
LU30	03/05/1993	Oblique
RC8DV163	11/07/1981	Vertical
RC8DV164	11/07/1981	Vertical
RC8HH207	06/03/1985	Vertical
RC8HH208	06/03/1985	Vertical
RC8HI034	12/03/1985	Vertical
RC8HI035	12/03/1985	Vertical
RC8HI075	12/03/1985	Vertical
RC8HI076	12/03/1985	Vertical
RC8HI102	12/03/1985	Vertical
RC8HI103	12/03/1985	Vertical
RC8HI142	12/03/1985	Vertical
RC8HI143	12/03/1985	Vertical
RC8HI170	12/03/1985	Vertical
RC8HI171	12/03/1985	Vertical
RC8HI172	12/03/1985	Vertical
RC8IJ273	06/11/1985	Vertical
RC8IJ274	06/11/1985	Vertical
RC8IJ275	06/11/1985	Vertical

2.10 Figures

- CH-004-13.01 Remote sensing survey interpretation 1:5,000
- CH-004-13.02 Remote sensing survey interpretation 1:5,000
- CH-004-13.03 Remote sensing survey interpretation 1:5,000
- CH-004-13.04 Remote sensing survey interpretation 1:5,000
- CH-004-13.05 Remote sensing survey interpretation 1:5,000
- CH-004-13.06 Remote sensing survey interpretation 1:5,000
- CH-004-13.07 Remote sensing survey interpretation 1:5,000
- CH-004-13.08 Remote sensing survey interpretation 1:5,000
- CH-004-13.09 Remote sensing survey interpretation 1:5,000

3 Geophysical surveys

3.1 Site AVoAE: Calvert

Introduction

3.1.1 An archaeological geophysical survey in Calvert, Steeple Claydon, Twyford and Chetwode study area on a site located to the north of Calvert, Buckinghamshire (site code: AVoAE; Figure CH-004-13.10). The aim of the survey was to locate and characterise any anomalies of possible archaeological interest within the survey site.

The site

3.1.2 The survey site is located at gational grid reference SP 6810 2620, immediately south of West Street. It comprises two fields totalling approximately 16.9ha in extent (Figure CH-004-13.11). The fields were under pasture at the time of the survey.

3.1.3 The survey site stands at an elevation of between 84m and 87m above Ordnance Datum (AOD) on a slight, eastward-facing slope. It is underlain by Oxford Clay, which is capped by terrace gravel in the west and by a thin band of alluvium in the east[22].

Summary archaeological/historic background

3.1.4 Historic editions of the OS mapping dating from the late 19th and early 20th centuries show that the survey site was formerly occupied by allotments and was crossed by a series of access tracks. Earlier land use is indicated by the extensive ridge and furrow earthworks that survive across the area.

3.1.5 To the south of the survey site a post-medieval building and a single track railway line, possibly associated with the Calvert Works[23], have been identified. Threebridge Mill, a watermill dating to circa AD 1252 and believed to lie on the site of a mill recorded in the Domesday Book survey, is located to the north-west of the site[24]. Earthworks of uncertain date, but likely relating to a medieval shrunken village, have been identified at Twyford to the west of the survey area[25].

Methodology

3.1.6 The survey was carried out in line with current English Heritage guidelines[26] and a written scheme of investigation[27]. A detailed magnetometer survey of the site was undertaken on 2 to 5 July 2013.

3.1.7 An independent network of 30m grid squares was established across the survey area. Each grid was laid out with a tape measure and optical square and was tied in to the OS National Grid by recording the baseline location with a Leica Systems 1200 differential global positioning system. Survey pegs were left at the edges of each field and their precise locations were recorded for tie-in calibration purposes (Figure CH-004-13.12).

3.1.8 The survey data was collected with Bartington Grad 601-2, twin sensor array, vertical component fluxgate gradiometers. These are standard instruments for archaeological survey, capable of resolving magnetic field strength to a precision of 0.1 nanoTesla[28]. The instruments were carried at a brisk but steady pace through each grid square, collecting data along 1m-spaced traverse lines. Measurements were automatically triggered every 0.25m along the traverses, giving a total of 3,600 measurements per square.

3.1.9 The survey data was viewed and processed using Geoplot 3.00v software. Striping, caused by slight mismatches in sensor balance, was removed using the 'Zero Mean Traverse' function and destaggering of the data was performed as necessary. Greyscale bitmaps of the data (scale +/- 4 nanoTesla, black/white) were exported and were georectified using the RasTools function in MapInfo v8. XY trace plots of the data were not produced, as they were not considered to be appropriate in this instance.

Limitations

3.1.10 Magnetometer survey is a useful and widely deployed form of archaeological prospection, but it suffers from several well-recognised limitations[29]:

- it is a shallow-seeking technique, generally unable to detect archaeology beneath more than 1m of overburden;
- small and ephemeral remains (e.g. postholes, beam slots, cremation burials, etc.) are rarely detected, especially at the standard survey resolution of 1m x 0.25m;
- stone building remains can only be detected under particularly favourable conditions;
- the technique can be ineffective over certain geological substrates which do not support the formation of well-developed contrasts in soil magnetism. It may also be hindered by highly magnetic geologies (e.g. ironstone, igneous dykes); and
- certain modern structures (e.g. fences, steel-framed buildings, water pipes) produce intense magnetic halos which can obscure the much weaker anomalies arising from archaeological remains.

Assumptions

3.1.11 There are no methodological assumptions applicable to the conduct of this survey. Readers should be aware, however, that the interpretation of archaeological geophysical data is a qualitative process, based on a combination of theoretical principles and past experience, and that absolute confidence is not always achievable.

[22] British Geological Survey; GeoIndex; http://mapapps2.bgs.ac.uk/geoindex/home.html; Accessed: 31 July 2013.
[23] English Heritage National Monuments Record No. SP 62 NE 23.
[24] English Heritage National Monuments Record No. SP 62 NE 8.
[25] English Heritage National Monuments Record No. NMR SP 62 NE 11.
[26] English Heritage, (2008), Geophysical Survey in Archaeological Field Evaluation.
[27] Cotswold Archaeology, (2013), *HS2 Buckinghamshire: Written Scheme of Investigation for Geophysical and Metal Detecting Surveys*.

[28] Bartington, G. and Chapman, C., (2003) A *high-stability fluxgate magnetic gradiometer for shallow geophysical survey applications*, Archaeological Prospection, Vol. 11, Pgs. 19-34.
[29] English Heritage, (2008), *Geophysical Survey in Archaeological Field Evaluation* Pgs. 13-18.

Results: description

3.1.12 See Figures CH-004-13.13 and CH-004-13.14. The data sets from the two fields are broadly similar in character, with parallel linear anomalies crossing each field from east to west and a band of densely-clustered amorphous positive and negative anomalies dominating the western part of the survey area. Field 2 also contains a set of linear anomalies aligned north/south along its eastern side. Dipolar anomalies of varying size and character are also present in both fields.

3.1.13 The linear anomalies in Field 1 are broad, straight and rather fragmentary in appearance. One, in the northern part of the field, stands out as being slightly stronger and more clearly defined than the others.

3.1.14 The north/south-aligned linear anomalies in Field 2 are similar in character to the east/west-aligned ones in Field 1, although a little more sinuous. The same is true for the majority of the east/west aligned anomalies in Field 2, but a few of these stand out as being straighter and slightly more distinct than the rest.

3.1.15 The amorphous positive and negative anomalies in the western half of the survey area form a crescent-shaped band which extends across both fields. Two smaller amorphous concentrations of positive and negative anomalies are evident in Field 1, and there are some weakly positive curvilinear anomalies, trending from north to south, straddling the boundary between the two fields.

3.1.16 Near the north-eastern corner of Field 1, there is a weak but nonetheless distinct linear anomaly of alternating magnetic polarity. It is aligned north-east/south-west. A less well-defined linear anomaly occupies a parallel alignment approximately 50m to the west.

3.1.17 The dipolar anomalies are mostly distributed at random, but four large ones occur in a row across the northern half of Field 2 and others of similar or greater size are concentrated in the north-western corner of the same field, in an area that measures approximately 25m x 40m. A ferrous halo is present in the north-eastern corner of Field 1, and some lesser halos are present elsewhere around the field margins.

Results: interpretation

3.1.18 See Figure CH-004-13.14. The majority of the linear anomalies in the survey area represent ridge and furrow, but a few of the more distinct east/west-aligned anomalies relate to the network of allotment tracks depicted on the early editions of the OS mapping. More generally, the disturbed and fragmentary appearance of the ridge and furrow anomalies may be attributed to the physical disturbance caused by the cultivation of the allotments.

3.1.19 The linear anomaly of alternating polarity in Field 1 is diagnostic of a field drain. The parallel anomaly in the same field is less diagnostic, but could be interpreted most plausibly as another drain.

3.1.20 The crescent-shaped band of positive and negative anomalies and the smaller amorphous clusters in Field 2 are geological in origin. Their distribution coincides, in broad terms, with the extent of the gravel terrace mapped by the British Geological Survey[30]. The curvilinear anomalies to the south-east are of uncertain origin but perhaps represent former water channels.

3.1.21 Dipolar anomalies and magnetic halos are generally diagnostic of ferrous objects. Most of those detected in this survey will indicate small pieces of scrap metal, scattered at random in the topsoil, but a few can be attributed to more specific causes. For instance, the row of four discrete dipoles in Field 2 represents a row of telegraph poles and the large dipole south of the lake represents a pair of water troughs. The cluster of dipoles in the north-western corner of the survey area may indicate a more significant concentration of scrap metal, perhaps in the backfill of a former pond or gravel pit.

Conclusions

3.1.22 The survey has detected medieval ridge and furrow and slight traces of late 19th-century allotments. The survey also detected a complex set of geological responses from the terrace gravels in the west of the site.

3.1.23

3.2 Site AVoAB: Twyford

Introduction

3.2.1 An archaeological geophysical survey was undertaken at a site at Twyford, Buckinghamshire (site code: AVoAB; Figure CH-004-13.15). The aim of the survey was to locate and characterise any anomalies of possible archaeological interest within the survey site.

The site

3.2.2 The survey site is located at NGR SP 6670 2690, immediately north-east of Twyford (Figure CH-004-13.16). It comprises four pasture fields, totalling approximately 11.19ha in extent, lying between Padbury Brook to the north and the dismantled Great Central Railway to the south. Further pasture fields extend to the east and west of the site.

3.2.3 The survey site stands at an elevation of between 83m and 85m AOD on a slight north-eastward facing slope. The underlying geology consists of mudstones (Peterborough Member, Jurassic Oxford Clay) overlain by terrace and alluvial deposits[31].

[30] British Geological Survey; GeoIndex; Accessed: 31 July 2013.
[31] British Geological Survey; GeoIndex; Accessed: 31 July 2013

Summary archaeological/historic background

3.2.4 Ridge and furrow earthworks survive extensively across the survey site, and historic mapping shows that an early 20th century farm building once stood close to the south-eastern corner of Field 1.

3.2.5 To the immediate south-west of the survey site, there are earthworks relating to medieval settlement. These partially surround the 13th century St Mary's Church[32] and a 15th century vicarage which lie at the northern end of the modern village of Twyford. Other medieval earthworks, including house platforms, boundary ditches[33] and a hollow way[34], exist to the west of the village, and further possible house platforms are located on the village recreation ground[35]. It is thus clear that there has been a large amount of settlement shrinkage in the area since the medieval period.

3.2.6 Within the modern village there are a number of buildings with 17th century origins, such as The Red Lion Inn[36] and Beville House[37]. A 14th century water mill[38] lies to the north-west of the survey site, along the Padbury Brook.

3.2.7 The 19th century saw the construction of two railway bridges in the vicinity of the survey site. One carries the road to Twyford over the dismantled Grand Central Railway Line[39]; another (now demolished) carried the railway line over a minor road[40].

Methodology

3.2.8 The survey was carried out in line with current English Heritage guidelines[41] and a written scheme of investigation[42]. A detailed magnetometer survey of the site was undertaken on 12 to 13 June 2013.

3.2.9 An independent network of 30m grid squares was established across the survey area. Each grid was laid out with a tape measure and optical square and was tied in to the OS National Grid by recording the baseline location with a Leica Systems 1200 differential global positioning system (Figure CH-004-13.17). Two survey pegs were left on site as Global Positioning System (GPS) calibration points, as requested in the survey specification[43].

3.2.10 The survey data was collected with Bartington Grad 601-2, twin sensor array, vertical component fluxgate gradiometers. These are standard instruments for archaeological survey, capable of resolving magnetic field strength to a precision of 0.1 nanoTesla[44]. The instruments were carried at a brisk but steady pace through each grid square, collecting data along 1m-spaced traverse lines. Measurements were automatically triggered every 0.25m along the traverses, giving a total of 3,600 measurements per square.

[32] English Heritage National Monuments Record No. SP 62 NE 13.
[33] Buckinghamshire Historic Environment Record No. 0674400000.
[34] Buckinghamshire Historic Environment Record No. 0444602000.
[35] Buckinghamshire Historic Environment Record No. 0296104000.
[36] English Heritage National Monuments Record No. SP 62 NE 15
[37] English Heritage National Monuments Record No. SP 62 NE 16.
[38] English Heritage National Monuments Record No. SP 62 NE 12.
[39] Buckinghamshire Historic Environment Record No. 0579000003.
[40] Buckinghamshire Historic Environment Record No. 0579000002.
[41] English Heritage, (2008).
[42] Cotswold Archaeology, (2013).
[43] Cotswold Archaeology, (2013).
[44] Bartington, G. and Chapman, C., (2003), Pgs. 19-34.

3.2.11 The survey data was viewed and processed using Geoplot 3.00v software. Striping, caused by slight mismatches in sensor balance, was removed using the 'Zero Mean Traverse' function and destaggering of the data was performed as necessary. Greyscale bitmaps of the data (scale +/- 4nanoTesla, black/white) were exported and were georectified using the RasTools function in MapInfo v8. XY trace plots of the data were not produced, as they were not considered to be appropriate in this instance.

Limitations

3.2.12 Magnetometer survey is a useful and widely deployed form of archaeological prospection, but it suffers from several well-recognised limitations[45]:

- it is a shallow-seeking technique, generally unable to detect archaeology beneath more than 1m of overburden;
- small and ephemeral remains (e.g. postholes, beam slots, cremation burials, etc.) are rarely detected, especially at the standard survey resolution of 1m x 0.25m;
- stone building remains can only be detected under particularly favourable conditions;
- the technique can be ineffective over certain geological substrates which do not support the formation of well-developed contrasts in soil magnetism. It may also be hindered by highly magnetic geologies (e.g. ironstone, igneous dykes); and
- certain modern structures (e.g. fences, steel-framed buildings, water pipes) produce intense magnetic halos which can obscure the much weaker anomalies arising from archaeological remains.

Assumptions

3.2.13 There are no methodological assumptions applicable to the conduct of this survey. Readers should be aware, however, that the interpretation of archaeological geophysical data is a qualitative process, based on a combination of theoretical principles and past experience, and that absolute confidence is not always achievable.

Results: description

3.2.14 See Figures CH-004-13.18 and CH-004-13.19. The data from Field 1 contains two sets of parallel, magnetically-negative linear anomalies. One set occurs in the northern half of the field and is aligned north-east/south-west; the other occurs in the southern part of the field and is aligned north-west/south-east. Three very weakly magnetic linear anomalies with alternating polarity occur concurrently with the latter set; a few parallel positive anomalies, aligned south-west/north-east, are also apparent. One isolated positive linear anomaly, circa 20m long and aligned north-west/south-east, occurs close to the eastern field boundary.

3.2.15 Clusters of intense but generally small dipolar anomalies occur near the south-eastern and north-western corners of Field 1. A more diffuse scatter of similar anomalies occurs in the

[45] English Heritage, (2008), Pgs. 13-18.

south-western corner of this field, where there is also a positive magnetic halo. Another magnetic halo occurs in the north-eastern corner of the field.

3.2.16 Field 2 contains an ill-defined set of parallel linear anomalies aligned approximately south-west/north-east. Four other linear anomalies are present in the eastern end of the field. Two are broad and positive with slightly irregular forms, and are aligned north/south. The others, one positive and one negative, are aligned south-west/north-east. Each set commences at the southern field boundary and has indistinct terminations to the north.

3.2.17 Near to the southern edge of Field 2, there is one discrete sub-circular positive anomaly, measuring approximately 2m across, with a group of more irregularly-shaped discrete anomalies to the west. Elsewhere in the field, there are a few small dipolar anomalies, distributed randomly. A negative magnetic halo occurs close to the northern corner of the field.

3.2.18 The data from Field 3 contains a cluster of large and intense dipolar anomalies with extensive halos. These are located at the western edge of the field, on the site of a former meander. To the north-east, close by the brook, there are a few amorphous positive anomalies. Small dipolar anomalies are distributed randomly across the field.

3.2.19 A single weakly negative linear anomaly crosses the eastern end of Field 4, running north-west/south-east. A few magnetic halos occur around the margins of this field, and small dipolar anomalies are distributed randomly across it.

Results: interpretation

3.2.20 See Figure CH-004-13.19. The two main sets of parallel anomalies in Field 1 and the main set in Field 2 correspond to the surviving ridge and furrow earthworks. The other sets of parallel anomalies in Field 1 are indicative of modern (19th century or later) field drains.

3.2.21 The discrete linear anomaly near the eastern edge of Field 1 is of uncertain significance. It has been marked as a ditch on the interpretation plot, but it might alternatively represent a field drain. The two pairs of linear anomalies at the eastern end of Field 2 are also difficult to interpret. They could represent archaeological features (perhaps ditches or trackways), but the evidence is inconclusive and non-archaeological interpretations cannot be ruled out.

3.2.22 The linear anomaly which crosses Field 4 is not thought to be archaeological in nature. It could represent a particularly deep plough furrow or, more probably, a pipe trench supplying water to a cattle trough. The discrete positive anomalies at the southern edge of Field 2 are not especially diagnostic, but there is a chance that they could represent pits.

3.2.23 The concentration of dipolar anomalies at the south-western corner of Field 1 coincides with the location of a former early 20th century farm building and indicates the presence of brick rubble, ferrous scrap and similar demolition materials. The anomalies in the south-western corner of this field probably represent a scatter of hardcore from the adjacent gateway.

3.2.24 The amorphous anomalies at the northern end of Field 3 are characteristic of alluviated ground, and are of no archaeological significance. The much more intense anomalies at the western edge of the same field coincide very closely with the line of an abandoned meander, and suggest that this feature has been backfilled with soil that contains a large amount of ferrous scrap. The similarly intense anomalies at the north-western corner of Field 1 may also represent former hollows backfilled with rubbish.

3.2.25 The small dipolar anomalies which are present across the survey area are likely to represent insignificant pieces of ferrous debris within the topsoil. The halos around the field boundaries are similarly insignificant, merely reflecting the presence of adjacent gates and fences.

Conclusions

3.2.26 The survey has detected medieval ridge and furrow and a concentration of demolition rubble from an early 20th century farm building. It has also identified a few poorly-diagnostic anomalies which perhaps represent pits and ditches of archaeological interest.

3.3 Site AVoAC: Chetwode

Introduction

3.3.1 An archaeological geophysical survey on a site at Chetwode, Buckinghamshire (site code: AVoAC; Figure CH-004-13.20). The aim of the survey was to locate and characterise any anomalies of possible archaeological interest within the survey site.

The site

3.3.2 The site lies at NGR SP 6340 3010. It is within the parish of Barton Hartshorn approximately 500m north-west of Chetwode village (Figure CH-004-13.21). The site consists of an irregular block of land, approximately 13.9ha in extent. It is divided into four fields bisected by the former Great Central Railway. To the immediate north-west lies HS2 survey site AV0AD (Newton Purcell; see Section 3.4 of this report).

3.3.3 The survey site lies on a gentle, west-facing slope at an elevation of between 95m AOD and 110m AOD. A small stream flows at the foot of this slope, along the western edge of the area. The local geology comprises Peterborough Member mudstone and Kellaways Formation sandstone. The superficial deposits comprise Mid Pleistocene Glaciofluvial deposits and till. There is a capping of boulder clay on the upper part of the slope and a narrow band of alluvium along the stream. A deposit of glacial sand and gravel fringes the lower edge of the boulder clay[46].

Summary archaeological/historic background

3.3.4 The survey site contains ridge and furrow which has been levelled by later ploughing but which is still apparent on aerial photographs. A windmill mound stood close to the south-

[46] British Geological Survey; GeoIndex; Accessed: 24 July 2013.

western corner of the site, but was destroyed during the construction of the Great Central Railway in the late 19th century[47].

3.3.5 A cropmark suggests the presence of a ploughed-out Bronze Age barrow[48] approximately 350m northeast of the survey site, near to Church Wood. Roman coins have been found in the vicinity of the modern village[49], and there are various medieval remains in the same area. These include the remains of the 13th century Chetwode Priory and associated fishponds, as well as several homestead moats[50].

Methodology

3.3.6 The survey was carried out in line with current English Heritage guidelines[51] and a written scheme of investigation[52]. A detailed magnetometer survey of the site was undertaken on 12th to 14th June 2013.

3.3.7 An independent network of 30m grid squares was established across the survey area. Each grid was laid out with a tape measure and optical square and was tied in to the OS National Grid by recording the baseline location with a Leica Systems 1200 differential global positioning system. Survey pegs were left at the eastern edge of Field 1 and the north-western corner of Field 2, and their locations were recorded for tie-in calibration purposes (Figure CH-004-13.22).

3.3.8 The survey data was collected with Bartington Grad 601-2, twin sensor array, vertical component fluxgate gradiometers. These are standard instruments for archaeological survey, capable of resolving magnetic field strength to a precision of 0.1nanoTesla[53]. The instruments were carried at a brisk but steady pace through each grid square, collecting data along 1m-spaced traverse lines. Measurements were automatically triggered every 0.25m along the traverses, giving a total of 3,600 measurements per square.

3.3.9 The survey data was viewed and processed using Geoplot 3.00v software. Striping, caused by slight mismatches in sensor balance, was removed using the 'Zero Mean Traverse' function and destaggering of the data was performed as necessary. Greyscale bitmaps of the data (scale +/- 4nanoTesla, black/white) were exported and were georectified using the RasTools function in MapInfo v8. XY trace plots of the data were not produced, as they were not considered to be appropriate in this instance.

Limitations

3.3.10 Magnetometer survey is a useful and widely deployed form of archaeological prospection, but it suffers from several well-recognised limitations[54]:

- it is a shallow-seeking technique, generally unable to detect archaeology beneath more than 1m of overburden;
- small and ephemeral remains (e.g. postholes, beam slots, cremation burials, etc.) are rarely detected, especially at the standard survey resolution of 1m x 0.25m;
- stone building remains can only be detected under particularly favourable conditions;
- the technique can be ineffective over certain geological substrates which do not support the formation of well-developed contrasts in soil magnetism. It may also be hindered by highly magnetic geologies (e.g. ironstone, igneous dykes); and
- certain modern structures (e.g. fences, steel-framed buildings, water pipes) produce intense magnetic halos which can obscure the much weaker anomalies arising from archaeological remains.

Assumptions

3.3.11 There are no methodological assumptions applicable to the conduct of this survey. Readers should be aware, however, that the interpretation of archaeological geophysical data is a qualitative process, based on a combination of theoretical principles and past experience, and that absolute confidence is not always achievable.

Results: description

3.3.12 See Figures CH-004-13.23 and CH-004-13.24. The data from Fields 1 and 3 in the western half of the survey area is generally quite bland, with only a few localised anomalies of note. Two small zones of amorphous positive anomalies occur at the western end of Field 1, close to the stream, and a small zone of weak magnetic noise (less than 5nanoTesla in strength) occurs slightly north of centre in this field. Another small area of magnetic noise occurs at the southern tip of Field 3, and there is one large dipolar anomaly at the northern end of this field.

3.3.13 The data sets from Fields 2 and 4, in the eastern part of the survey area, are dominated by parallel, sinuous, weakly positive magnetic anomalies aligned approximately east/west. A much more intense linear anomaly, with alternating magnetic polarity, runs along the eastern boundary of Field 2 and continues part way along the eastern boundary of Field 4. Some minor and generally ill-defined linear trends are present in these fields, and there is a zone of small discrete positive anomalies in the north-western sector of Field 4.

3.3.14 A few small dipolar anomalies are present across all four fields, and there are various magnetic halos around the field boundaries. None of these anomalies are significant enough to merit detailed description.

Results: interpretation

3.3.15 See Figure CH-004-13.24. The parallel linear anomalies in Fields 2 and 4 represent ridge and furrow of medieval origin. Further linear trends in these fields may represent sections of enclosure or boundary ditches, although the evidence for this is by no means conclusive.

3.3.16 The small area of magnetic noise in Field 1 lies close to the position of a recently removed hedgeline. It suggests the presence of burnt soil, perhaps from a bonfire associated with the removal of the hedge. The similar magnetic noise at the southern end of Field 3 is of unknown

[47] Buckinghamshire Historic Environment Record No. 0513700000.
[48] Buckinghamshire Historic Environment Record No. 0584300000.
[49] Buckinghamshire Historic Environment Record No. 0593800000.
[50] Buckinghamshire Historic Environment Record Nos. 0444602000, 0031900000, 0038300000 and 00038200000.
[51] English Heritage, (2008), *Geophysical Survey in Archaeological Field Evaluation.*
[52] Cotswold Archaeology, (2013), *HS2 Buckinghamshire: Written Scheme of Investigation for Geophysical and Metal Detecting Surveys.*
[53] Bartington, G. and Chapman, C., (2003), *A high-stability fluxgate magnetic gradiometer for shallow geophysical survey applications* Pgs. 19-34.
[54] English Heritage, (2008), *Geophysical Survey in Archaeological Field Evaluation* Pgs. 13-18.

origin, but most probably represents a deposit of hardcore, clinker or other debris deriving from the adjacent railway.

3.3.17 The intense linear anomaly along the eastern edge of Fields 2 and 4 is diagnostic of a modern pipe, and the magnetic halos around the other field boundaries are due to adjacent gates and wire fences. The various dipolar anomalies elsewhere in the survey almost certainly represent ferrous objects; the large example in Field 3 is thought to have been caused by a trough.

3.3.18 The amorphous anomalies at the western end of Field 1 are likely to be of alluvial origin. Those in the north-western part of Field 4 may also have a geological cause, but do not permit a more specific interpretation.

Conclusions

3.3.19 The survey has not identified any definite archaeological remains, apart from medieval ridge and furrow. Some minor trends in the data may represent sections of enclosure or boundary ditches, but this interpretation is tentative, and is based on very equivocal evidence.

3.3.20

3.4 Site AVoAD: Newton Purcell

Introduction

3.4.1 An archaeological geophysical survey was undertaken on a site near Newton Purcell (site code: AV0AD; Figure CH-004-13.25). The site lies on the Oxfordshire/Buckinghamshire county boundary. The aim of the survey was to locate and characterise any anomalies of possible archaeological interest within the survey site.

The site

3.4.2 The site lies at NGR SP 6310 3050, within the parish of Barton Hartshorn, approximately 600m to the east of Newton Purcell village (Figure CH-004-13.26). It consists of an elongated block of pasture land, approximately 11.3ha in extent, divided into two fields by the former Great Central Railway. To the south-east lies HS2 survey site AV0AC (Chetwode; see Section 3.3 of this report).

3.4.3 The survey site lies on a gentle south-east facing slope at an elevation of between 95m AOD and 110m AOD. A stream flows at the foot of this slope, along the eastern edge of the site, and there is a pond in the southern half of the western field (Field 2). The local geology comprises Cornbrash and Kellaways Clay, with a capping of boulder clay on the upper part of the slope and a narrow band of alluvium alongside the stream[55].

[55] British Geological Survey, *GeoIndex*; Accessed: 24 July 2013

Summary archaeological/historic background

3.4.4 The site is known to contain the ploughed-out remains of ridge and furrow. Known archaeological features in the vicinity of the site include the presumed line of a Roman road[56] and earthworks associated with the shrunken medieval villages of Newton Purcell[57] and Barton Hartshorn[58]. Slightly further afield, there are ring ditch cropmarks in the vicinity of Spillsmere Wood and Finmere Airfeld[59].

Methodology

3.4.5 The survey was carried out in line with current English Heritage guidelines[60] and a written scheme of investigation[61]. A detailed magnetometer survey of the site was undertaken on 10th and 11th June 2013.

3.4.6 An independent network of 30m grid squares was established across the survey area. Each grid was laid out with a tape measure and optical square and was tied in to the OS National Grid by recording the baseline location with a Leica Systems 1200 differential global positioning system. Survey pegs were left at the edges of each field, close to the tunnel under the embankment, and their precise locations were recorded for tie-in calibration purposes (Figure CH-004-13.27).

3.4.7 The survey data was collected with Bartington Grad 601-2, twin sensor array, vertical component fluxgate gradiometers. These are standard instruments for archaeological survey, capable of resolving magnetic field strength to a precision of 0.1nanoTesla[62]. The instruments were carried at a brisk but steady pace through each grid square, collecting data along 1m-spaced traverse lines. Measurements were automatically triggered every 0.25m along the traverses, giving a total of 3,600 measurements per square.

3.4.8 The survey data was viewed and processed using Geoplot 3.00v software. Striping, caused by slight mismatches in sensor balance, was removed using the 'Zero Mean Traverse' function and destaggering of the data was performed as necessary. Greyscale bitmaps of the data (scale +/- 4nanoTesla, black/white) were exported and were georectified using the RasTools function in MapInfo v8. XY trace plots of the data were not produced, as they were not considered to be appropriate in this instance.

Limitations

3.4.9 Magnetometer survey is a useful and widely deployed form of archaeological prospection, but it suffers from several well-recognised limitations[63]:

- it is a shallow-seeking technique, generally unable to detect archaeology beneath more than 1m of overburden;

[56] Buckinghamshire Historic Environment Record No. 0298000000.
[57] Oxfordshire Historic Environment Record No. 4284.
[58] Buckinghamshire Historic Environment Record No. 0231900000.
[59] Oxfordshire Historic Environment Record Nos. 17476, 17477 and 17479.
[60] English Heritage, (2008), *Geophysical Survey in Archaeological Field Evaluation.*
[61] Cotswold Archaeology, (2013), *HS2 Buckinghamshire: Written Scheme of Investigation for Geophysical and Metal Detecting Surveys*.
[62] Bartington, G. and Chapman, C., (2003), *A high-stability fluxgate magnetic gradiometer for shallow geophysical survey applications* Pgs. 19-34.
[63] English Heritage, (2008), *Geophysical Survey in Archaeological Field Evaluation* Pgs. 13-18.

- small and ephemeral remains (e.g. postholes, beam slots, cremation burials, etc.) are rarely detected, especially at the standard survey resolution of 1m x 0.25m;
- stone building remains can only be detected under particularly favourable conditions;
- the technique can be ineffective over certain geological substrates which do not support the formation of well-developed contrasts in soil magnetism. It may also be hindered by highly magnetic geologies (e.g. ironstone, igneous dykes); and
- certain modern structures (e.g. fences, steel-framed buildings, water pipes) produce intense magnetic halos which can obscure the much weaker anomalies arising from archaeological remains.

Assumptions

3.4.10 There are no methodological assumptions applicable to the conduct of this survey. Readers should be aware, however, that the interpretation of archaeological geophysical data is a qualitative process, based on a combination of theoretical principles and past experience, and that absolute confidence is not always achievable.

Results: description

3.4.11 See Figures CH-004-13.28 and CH-004-13.29. The data from Field 1 contains a series of parallel linear anomalies aligned approximately east/west. The majority of these anomalies are weakly positive, but a few comprise ill-defined chains of small dipoles. They are most distinct in the western half of the field and become hard to trace in the eastern half, where the data is dominated by a zone of amorphous, weakly negative magnetic pattering. Other miscellaneous anomalies are also present in Field 1, including a moderately intense magnetic dipole (maximum intensity 53nanoTesla), a positive magnetic halo and a small area of magnetic 'noise'.

3.4.12 The data from the northern half of Field 2 is dominated by a series of weak, parallel linear anomalies of alternating magnetic polarity. Most of these anomalies are aligned east/west, but a set in the far north of the field are aligned north-west/south-east. Towards the centre of the field, the east/west-aligned anomalies intersect with a set of weakly positive parallel linear anomalies, which are also aligned north-west/south-east.

3.4.13 An intensely magnetic linear anomaly of alternating polarity has been detected at the western edge of Field 2. This anomaly follows a gently curving route, shadowing the line of the adjacent field boundary. To the east there is a small zone of densely clustered small dipolar anomalies.

3.4.14 In the southern half of Field 2 there is a palimpsest of magnetic anomalies, the most distinctive of which are parallel, sinuous, magnetically positive linear anomalies aligned north-west/south-east. These anomalies are very variable in strength, becoming most pronounced in the area south-east of the small pond. Close to the eastern edge of the field several of the parallel anomalies terminate against a positive linear anomaly which lies perpendicularly to them.

3.4.15 Two positive linear anomalies intersect with the sinuous anomalies in Field 2 and, if projected, would form an almost right-angled corner just to the east of the pond. The southern of the two positive linear anomalies terminates close to a cluster of small discrete positive anomalies and cuts across a right-angled negative anomaly shaped like a reversed 'Z'.

3.4.16 At the south-eastern edge of Field 2 there is a swathe of data that exhibits weak broad-scale variations in the background magnetic field. Elsewhere across the same field, there are various small dipoles, amorphous positive anomalies and other features which do not merit individual description.

Results: interpretation

3.4.17 See Figure CH-004-13.29. The parallel linear anomalies in both fields may be attributed to two different causes. The magnetically positive anomalies represent ridge and furrow, while those with alternating polarity are diagnostic of field drains. The coincidence of alignment for these two types of anomaly is not surprising, as it was often the case that field drains were inserted along relict plough furrows.

3.4.18 The linear anomaly which runs perpendicular to some of the ridge and furrow at the southern end of Field 2 may represent a former plough headland. Alternatively it may represent a former boundary ditch separating the medieval arable land from a belt of pasture or meadow alongside the stream.

3.4.19 The two other linear anomalies in Field 2 are harder to interpret. They seem to represent ditches. Their alignment shows that they are not contemporary with the ridge and furrow, but it is not clear whether they are ancient or modern in origin. As they do not correlate with any features on the historic editions of the OS maps, an early date might be favoured. It should be noted, however, that one of the anomalies has a similar alignment to a modern boundary on the opposite side of the railway embankment, a correspondence which might suggest a modern origin.

3.4.20 A number of anomalies in the southern end of Field 2 do not have a clear significance but may conceivably represent archaeological features. The cluster of small discrete positive anomalies may represent pits, and there is a slight chance that the negative, 'reversed Z' anomaly could represent wall footings. These tentative interpretations are supported by the strength of the nearby ridge and furrow anomalies, as the presence of occupation debris in the topsoil can be a cause of locally-enhanced magnetic contrasts.

3.4.21 The intense linear anomaly along the western edge of Field 2 is diagnostic of a modern pipeline. The dipolar anomalies scattered across the survey area represent various pieces of ferrous debris, and the small magnetic halos around the field boundaries arise from adjacent gates, fences and other modern structures.

3.4.22 The zones of weakly patterned and otherwise variable data along the eastern edge of the survey area are likely to be of geological origin. They could have a number of specific causes, but it is most likely that they represent areas of alluvial soil affected by gleying.

Conclusions

3.4.23 The survey has detected numerous anomalies relating to medieval ridge and furrow. Two further anomalies may represent boundary ditches of indeterminate date. Nothing else of an

obvious archaeological nature has been detected, but there are a few poorly diagnostic anomalies for which an archaeological interpretation cannot be ruled out.

3.5 References

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3.6 Figures

CH-004-13.10	AVoAE: Site location diagram	1:50,000
CH-004-13.11	AVoAE: Location of survey area	1:20,000
CH-004-13.12	AVoAE: Tie-in information	1:2,500
CH-004-13.13	AVoAE:Magnetometer data plot	1:2,500
CH-004-13.14	AVoAE: Interpretation plot	1:2,500
CH-004-13.15	AVoAB: Site location diagram	1:50,000
CH-004-13.16	AVoAB: Location of survey area	1:20,000
CH-004-13.17	AVoAB: Tie-in information	1:2,500
CH-004-13.18	AVoAB:Magnetometer data plot	1:2,500
CH-004-13.19	AVoAB: Interpretation plot	1:2,500
CH-004-13.20	AVoAC: Site location diagram	1:50,000
CH-004-13.21	AVoAC: Location of survey area	1:15,000
CH-004-13.22	AVoAC: Tie-in information	1:2,500
CH-004-13.23	AVoAC:Magnetometer data plot	1:2,500
CH-004-13.24	AVoAC: Interpretation plot	1:2,500
CH-004-13.25	AVoAD: Site location diagram	1:50,000
CH-004-13.26	AVoAD: Location of survey area	1:15,000
CH-004-13.27	AVoAD: Tie-in information	1:2,500
CH-004-13.28	AVoAD: Magnetometer data plot	1:2,500
CH-004-13.29	AVoAD: Interpretation plot	1:2,500

4 Fieldwalking surveys

4.1 Site AVoAC: Chetwode

Introduction

4.1.1 On 25 March 2013 an archaeological fieldwalking survey was conducted at a site west of Chetwode, Buckinghamshire (site code: AVoAC; centred on NGR: SP 6365 2951; Figure CH004.13.30). The objective of the survey was to provide further information on the archaeological potential of the survey site.

4.1.2 The fieldwalking survey was undertaken in accordance with a written scheme of investigation [64] and guidance issued by the Institute for Archaeologists[65] and English Heritage[66].

The site

4.1.3 The survey site lies some 0.4km north-west of Chetwode, in a triangle formed by the crossing of the defunct Great Central Railway (London Extension) and the minor road connecting Stratton Audley to Tingewick. The site is approximately 0.25km north-east of Barton Hill Farm (Figure CH-004-13.30).

4.1.4 The site encloses approximately 6.7ha. At the time of the survey it comprised a series of ploughed agricultural fields, with boundaries marked by hedgelines (Figure CH-004-13.31). The site lay on generally flat ground, although Field 2 rose gently to the east.

4.1.5 The site's bedrock geology is recorded as Peterborough Member mudstone and Kellaways Formation sandstone. These sedimentary bedrocks formed in shallow seas, approximately 159–164 million years ago (the Jurassic Period)[67].

4.1.6 Where recorded the site's superficial deposits comprise Mid Pleistocene Glaciofluvial deposits and till. These deposits formed in Ice Age conditions up to 2 million years ago (the Quaternary Period)[68].

Summary archaeological/historic background

4.1.7 The following information is summarised from the records of the Buckinghamshire HER.

4.1.8 It is likely that medieval Chetwode extended further to the south-west than the modern settlement. Evidence for this is provided by three moats present on the western edge of the current settlement and linear cropmarks noted on aerial photographs. One of the moats may have surrounded the Chapel of St. Lawrence and St. Stephen, which was founded in the 12th or 13th century.

[64] Cotswold Archaeology, (2013), *HS2, Buckinghamshire: Written Scheme of Investigation for an Archaeological Fieldwalking Survey.*
[65] Institute for Archaeologists, (2008), *Standard and Guidance for Archaeological Field Evaluation.*
[66] English Heritage, (1991), *Management of Archaeological Projects 2; English Heritage (2006) Management of Research Projects in the Historic Environment. (MoRPHE): Project Manager's Guide*, English Heritage, Swindon.
[67] British Geological Survey; Geology of Britain Viewer; http://maps.bgs.ac.uk/geology viewer_google/googleviewer.html; Accessed: 28 February 2013.
[68] British Geological Survey; Geology of Britain Viewer website.

4.1.9 The 13th century Chetwode Priory stood to the east of the site. Part of this building survives within the current parish church.

4.1.10 A mound stood at the western site boundary. This mound was excavated in the 19th century, when it was interpreted as a prehistoric barrow, although it was later re-interpreted as a possible windmill mound. The mound was destroyed during the construction of the Great Central Railway (London Extension) in the late 19th century.

Methodology

4.1.11 The fields within the survey site were numbered (Fields 1 and 2; Figure CH-004-13.31). A series of transects was established within the individual fields using a Leica Smart Rover GPS. These transects were spaced at 20m intervals. They were tied in to the OS grid and assigned alphabetic identifiers. Each field contained thirteen transects (A–M).

4.1.12 The fieldwalking team walked the length of these transects. A 2m-wide corridor centred on each individual transect was observed as a basis for artefact collection.

4.1.13 The length of each transect was subdivided into a series of 20m stints. Artefacts recovered from each individual stint were bagged together.

4.1.14 There was provision for artefacts considered by the survey team to be of special archaeological interest to be located individually using a Leica Smart Rover GPS. No such artefacts were recovered, however.

4.1.15 There was also provision for detailed fieldwalking at a greater resolution in areas where find concentrations were noted. It was decided in the field, however, that there was no need for such intensification of survey.

4.1.16 All artefacts were collected with the exception of any materials positively identified as modern. Any large concentrations of certain materials such as stone, slag and tile were sampled only.

Limitations

4.1.17 The effectiveness of fieldwalking surveys can be dependent on a number of factors, including land use, topography and weather conditions. Surveys are generally most effective on land which has been ploughed and where the ground surface is clearly visible, as these ground conditions facilitate movement of artefacts to the surface and aid subsequent artefact identification and retrieval.

4.1.18 The site was in agricultural use and had been ploughed recently, and would therefore have been suitable for fieldwalking. There was, however, extensive snow coverage on the day of the survey, which will have had a negative impact on artefact identification and retrieval.

Assumptions

4.1.19 There is a general assumption that surface concentrations of artefactual material overlie and originate from below-ground archaeological remains. It should be noted, however, that processes such as manuring and ploughing can spread artefacts over a wide area and as such, surface artefacts may not always denote the presence of archaeological sites. Nevertheless it is considered that the greater the concentration of artefacts, the less likely it is to have been redeposited by such processes.

4.1.20 It is often assumed that the higher the quantity of recovered artefacts, the more extensive the corresponding below-ground archaeological remains. The converse of this is that if no (or only very limited) artefacts are recovered, then it is assumed that there are no below-ground archaeological remains at the survey site. It should be noted, however, that different types of archaeological sites produce different quantities of artefactual material: for example, a medieval site may be associated with considerably more artefacts than an early prehistoric site, and a settlement site may produce more material than a ritual site which saw activity only during festivals. The limitations of fieldwalking surveys should also be borne in mind: the amount of artefacts recovered can be dependent upon a number of environmental and land-use factors.

Results: description

4.1.21 A brief description of each of the main periods/categories of recovered artefact is given below. A detailed report on the finds begins in Section 4.1.33 of this report. The artefact distributions are depicted on Figure CH-004-13.31.

Prehistoric (pre–AD 43): worked flint

4.1.22 Two pieces of worked flint of probable Mesolithic (circa.10,000–4,000 BC) or early Neolithic (circa.4,000–3,000 BC) date were recovered from the northern edge of Field 2.

Medieval (AD 1066–1539): pottery

4.1.23 Seven sherds of medieval pottery were recovered. These were scattered throughout the site. Five of the sherds dated to the later medieval period (post-circa 1250).

Post-medieval/modern (AD 1540–present): pottery and ceramic building material

4.1.24 Eighteen sherds of post-medieval/modern pottery were recovered. This material dated variously to the 17th/18th centuries and the later 18th/19th centuries. These sherds were scattered throughout the site.

4.1.25 Post-medieval ceramic building material was widespread across the site. A total of 659g of this material was recovered, the majority of which comprised brick and tile.

The finds

4.1.26 Surface-collected finds were recorded directly to a Microsoft Access database; their positions (Field/Transect/stint) were plotted using ARCview GIS software. All pottery was quantified by sherd count and weight according to period, and a note was made of fabrics or vessel forms where discernible. Prehistoric worked flint was quantified by count and class (flakes/cores/tools) and ceramic building material was recorded by period, group and weight.

4.1.27 Quantities of all artefact categories were small and the plotted spatial distribution demonstrates no obvious tendencies. The finds are described below in summary according to category and period as appropriate.

Prehistoric worked flint

4.1.28 Two pieces of worked flint were recorded from two stints. Both are non-retouched blades for which a Mesolithic or early Neolithic date is most likely.

Medieval pottery

4.1.29 A total of seven sherds (24g) of medieval pottery was recorded. Recorded types consist mainly of unglazed coarsewares among which Potterspury ware (Northamptonshire fabric CTS 329), a type common to the later medieval period after circa.1250[69], is most common (five sherds). Included among the Potterspury sherds is a rim from a jar with moulded (thickened/square) everted rim. A single glazed jug sherd of uncertain type was recorded from F1/G/60.

Post-medieval/modern pottery

4.1.30 Pottery of post-medieval or later date amounts to 18 sherds (168g) and was recovered from 16 stints. Recorded types are limited to (internally) black or clear-glazed earthenwares, unglazed earthenwares (flowerpot), refined whiteware and English stoneware. The glazed earthenware types date as early as the 17th or 18th centuries; the remainder probably to the later 18th or 19th centuries.

Post-medieval ceramic building material

4.1.31 This category of material was widespread across the survey area, amounting to a total of 659g from 15 locations. This category includes at least one land drain fragment; the remainder comprise flat roof tile fragments and undiagnostic brick or tile. One tile fragment, from F2/J/120 is of nib tile type.

Results: interpretation

4.1.32 The survey recovered only small quantities of artefactual material, with no clear distribution tendencies or patterns.

4.1.33 The small quantity of worked flint recovered from the site, coupled with the absence of prehistoric pottery, suggests that the site was not a focus of prehistoric activity. This supports the notion that the mound excavated at the western site boundary in the 19th century was not a barrow (see Summary archaeological/historic background, Section 4.1.7 of this report).

4.1.34 There was no evidence for activity associated with expanded medieval settlement at Chetwode or the Chapel of St. Lawrence and St. Stephen, suggesting that this activity did not extend as far west as the survey area.

4.1.35 The post-medieval material recovered from the site was fairly widespread and was probably deposited during field manuring or through the dumping of material to improve drainage or traction.

4.1.36 It should be noted, however, that extensive snow coverage on the day of the survey will have had an adverse impact on artefact retrieval. As such, the negative survey result is not reliable.

Conclusions

4.1.37 The survey recovered yielded only small quantities of artefactual material, with no clear distribution tendencies or patterns. There was no evidence for below-ground archaeological remains at the site. There was, however, extensive snow coverage on the day of the survey and this will have had an adverse impact on artefact retrieval. As such, the negative survey result is not reliable.

4.2 References

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4.3 Figures

CH-004-13.30	AVoAC: Site location plan	1:25,000
CH-004-13.31	AVoAC: Prehistoric, medieval and post-medieval/modern finds	1:2,000

[69] McCarthy, M., (1979), The pottery.In: Williams, J.H., *St Peter's Street Northampton: Excavations 1973-1976*, Northampton Development Corporation Archaeological Monograph No. 21979, 151–230.

WADDESDON AND QUAINTON

CALVERT, STEEPLE CLAYDON, TWYFORD AND CHETWODE

Pond Farm

Shrubs Wood

Dunnington Sewer

Sheephouse Wood

AYLESBURY VALE DISTRICT

Decoypond Wood

M01

M02

M03

M12

78+000

L37

Calvert

BRACKLEY LANE

TUSCAN CLOSE

COTSWOLDS WAY

SANDY ROAD

HEATHERS CLOSE

RUSTICS ROAD

SANDSTONE CLOSE

Legend

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary

Archaeological features

- Bank
- Ditch
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure

- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature

Location Map

Map Number: CH-004-13.01

Map Name: Remote Sensing Survey Interpretation

Community Forum Area CFA13: Calvert, Steeple Claydon, Twyford & Chetwode

Scale at A3: 1:5,000

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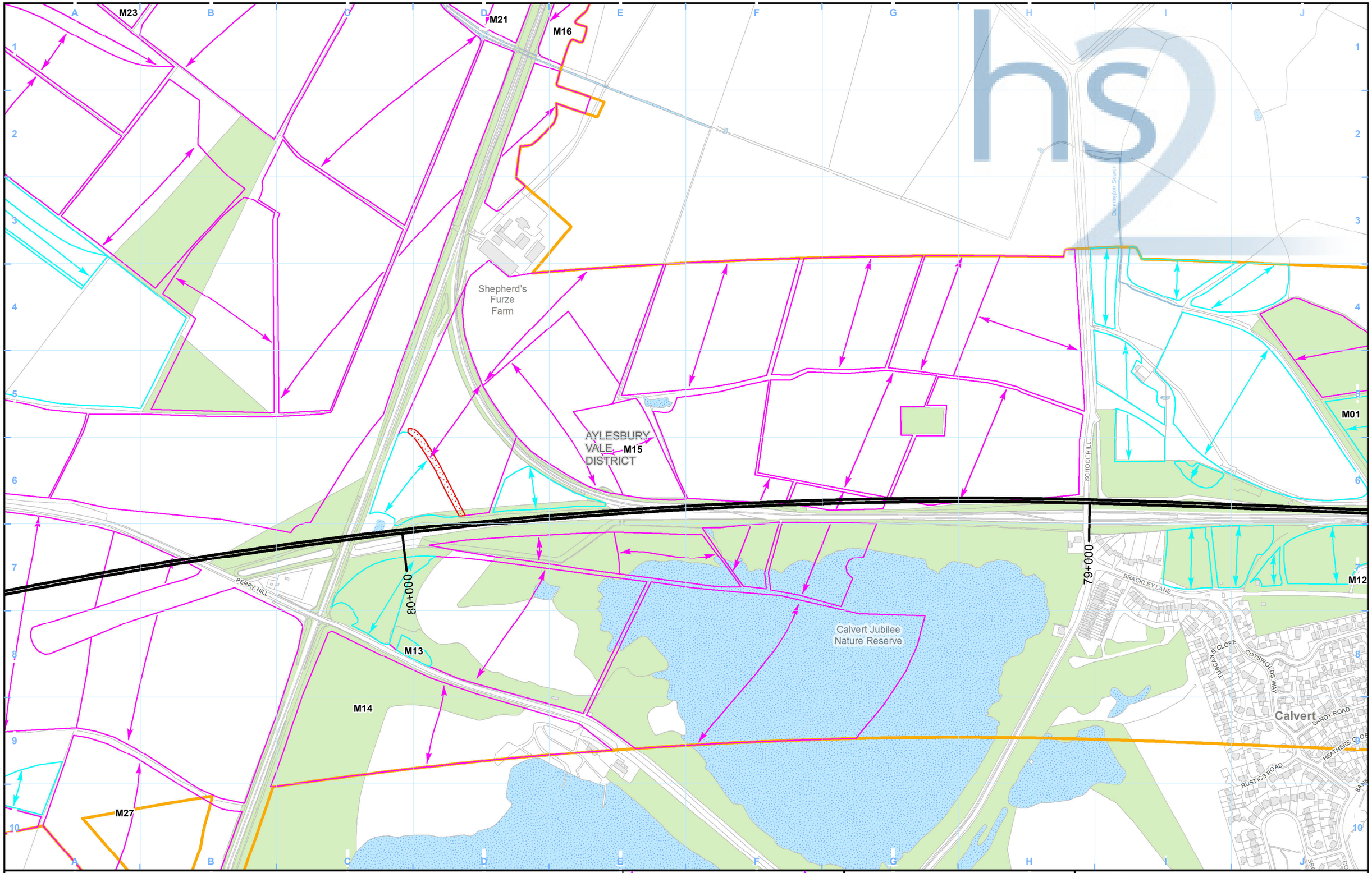
Date: 06/09/13



Legend

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary

Archaeological features
- Bank
- Ditch
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure

- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature

Location Map

Map Number: CH-004-13.02

Map Name: Remote Sensing Survey Interpretation

Community Forum Area CFA13: Calvert, Steeple Claydon, Twyford & Chetwode

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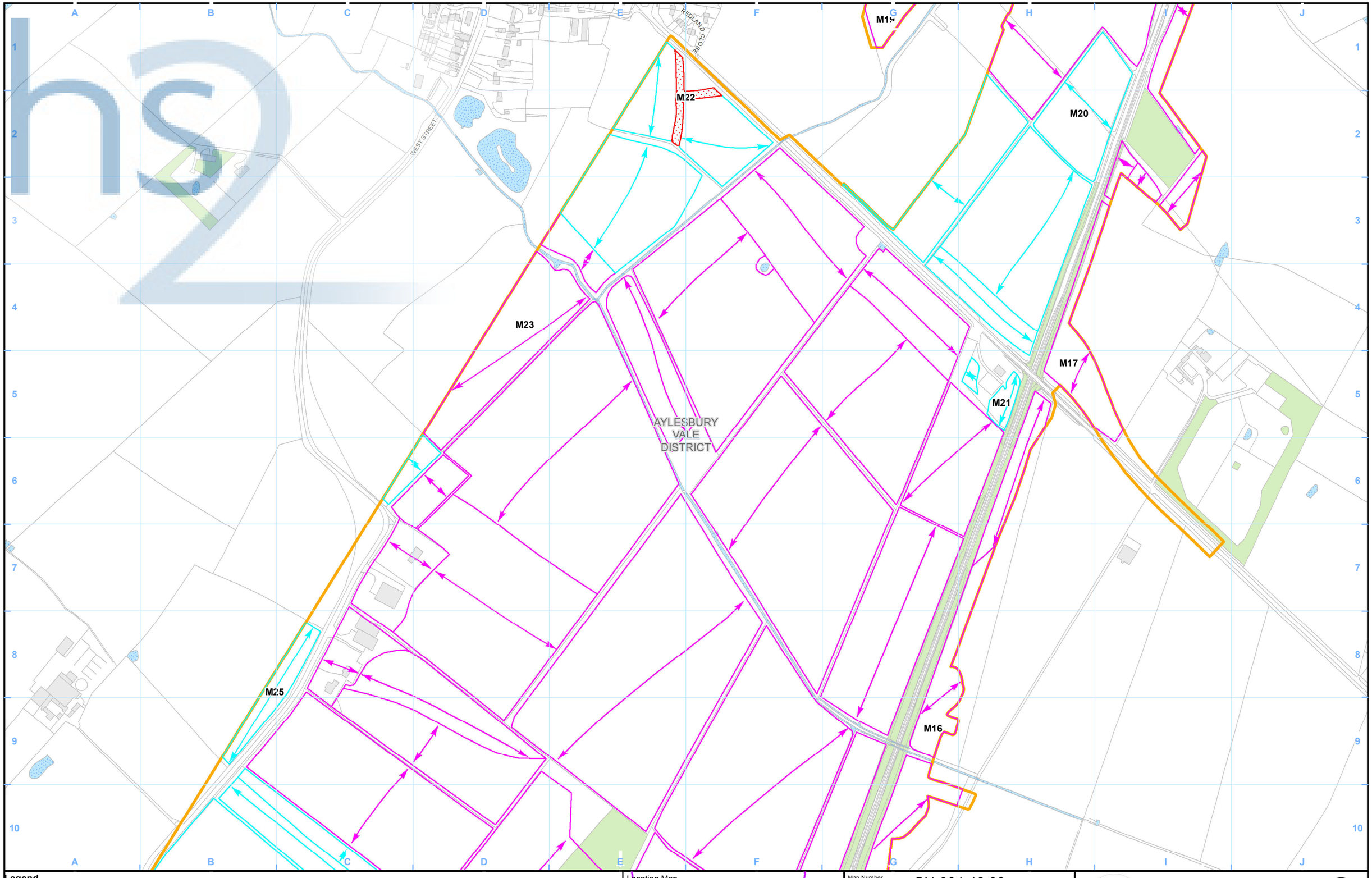
Date: 06/09/13



Legend

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary

Archaeological features

- Bank
- Ditch
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure

- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature

Location Map

Map Number: CH-004-13.03

Map Name: Remote Sensing Survey Interpretation

Community Forum Area CFA13:
Calvert, Steeple Claydon, Twyford & Chetwode

Scale at A3: 1:5,000

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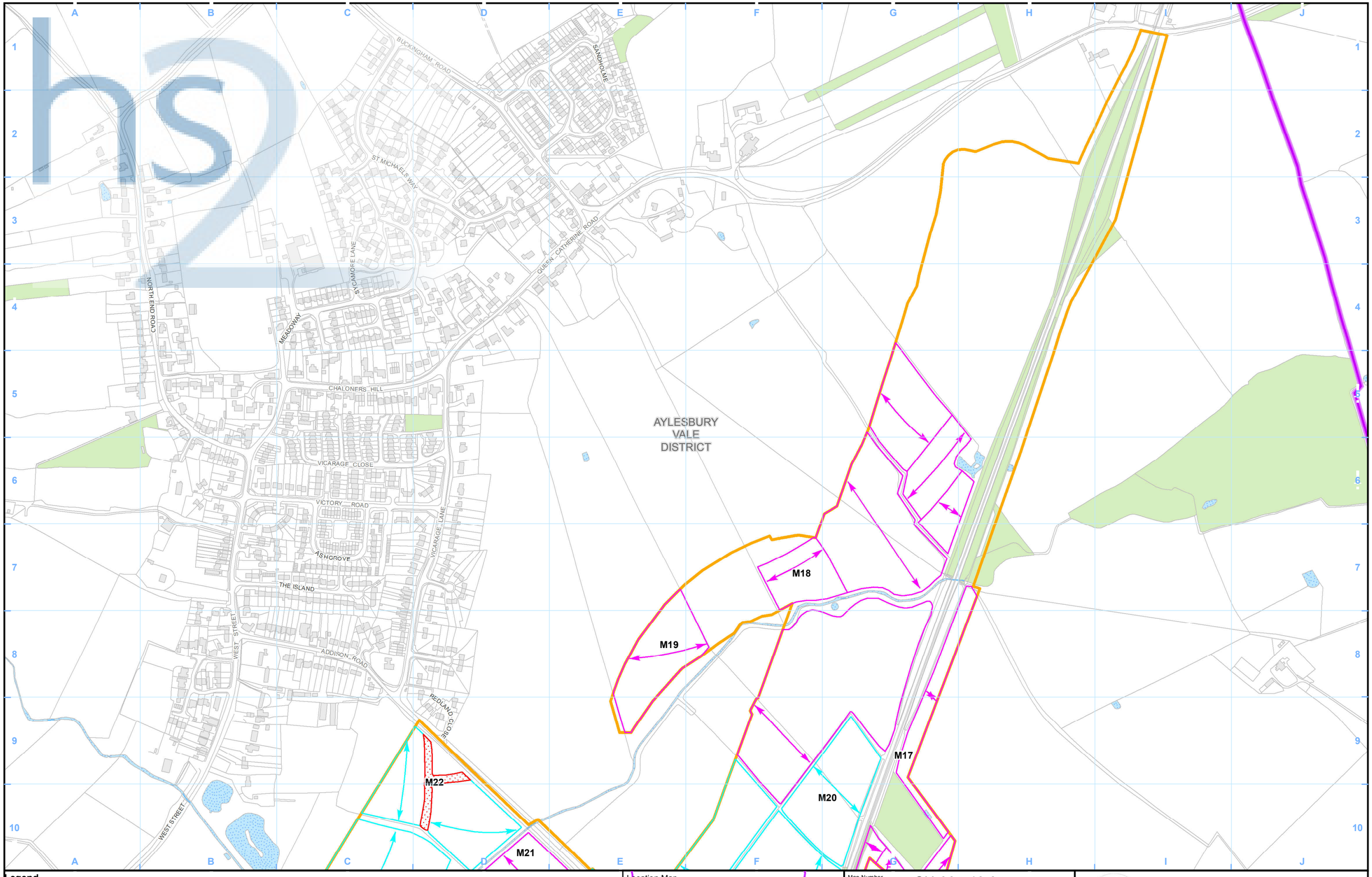
Date: 06/09/13



Legend

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary

Archaeological features
- Bank
- Ditch
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure

- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature

Location Map

Map Number: CH-004-13.04

Map Name: Remote Sensing Survey Interpretation

Community Forum Area CFA13: Calvert, Steeple Claydon, Twyford & Chetwode

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number: C252-ETM-EV-MAP-020-002919-P03.00

Date: 06/09/13

Cowley Lodge

Three Birdge Mill

Lake Farm

Seven Stars Cottage

M23

M24

M26

M30

M36

PERRY ROAD

AYLESBURY VALE DISTRICT

Padbury Brook

M31

M29

81+000

82+000

PERRY HILL

M04

M28

Portway Farm

Twyford

M32

M14

M33

CHURCH STREET

SCHOOL LANE

M27

Portway Cottages

PORTWAY ROAD

Home Farm

Legend

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary

Archaeological features

- Bank
- Ditch
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure

- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature

Location Map

Map Number: CH-004-13.05

Map Name: Remote Sensing Survey Interpretation

Community Forum Area CFA13: Calvert, Steeple Claydon, Twyford & Chetwode

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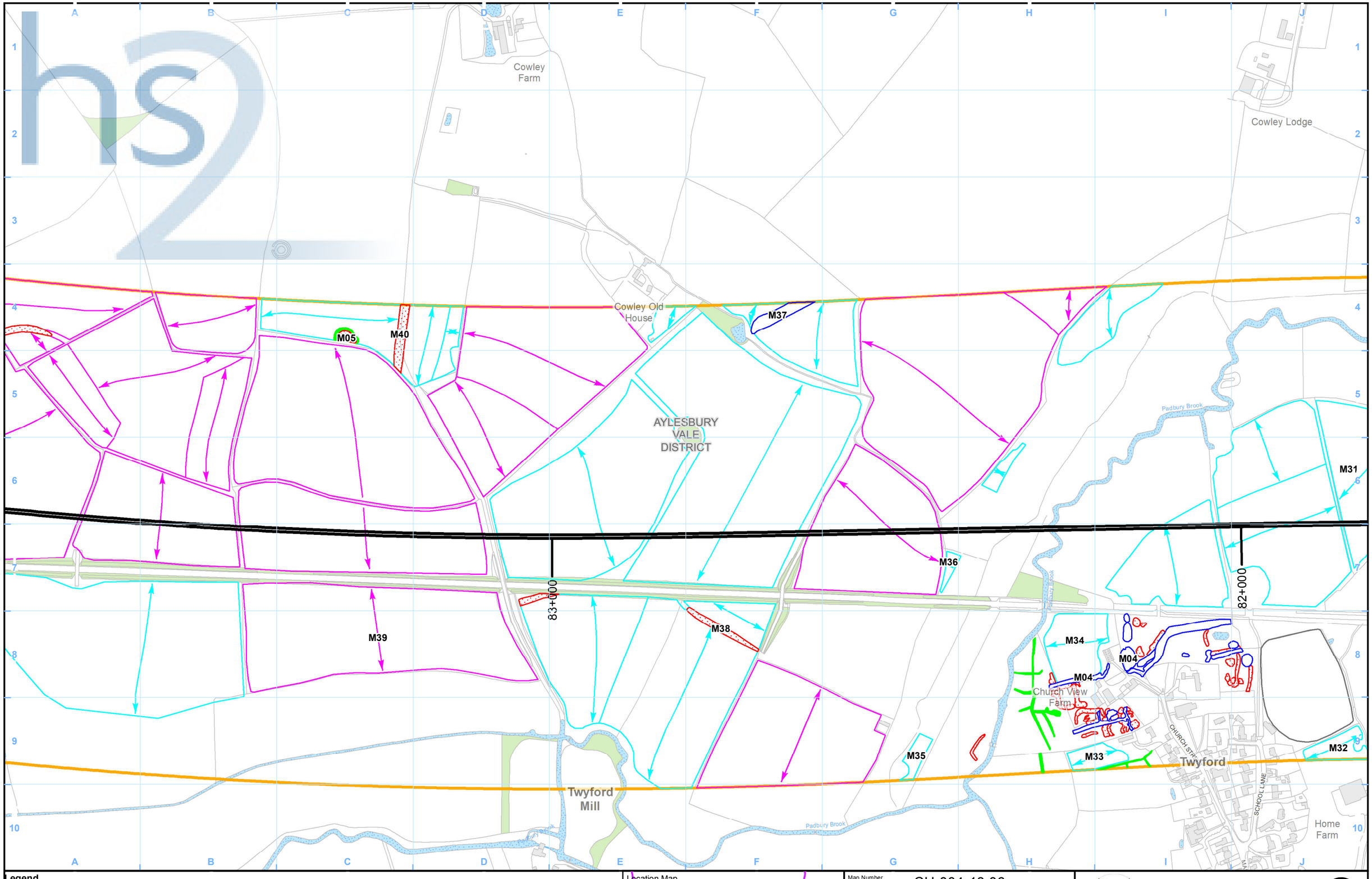

Legend

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary

Archaeological features

- Bank
- Ditch
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure

- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature

Location Map

Map Number: CH-004-13.06

Map Name: Remote Sensing Survey Interpretation

Community Forum Area CFA13: Calvert, Steeple Claydon, Twyford & Chetwode

Scale at A3: 1:5,000

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Doc Number: C252-ETM-EV-MAP-020-002596-P03.00

Date: 06/09/13

Casemore Farm

Casemore Farm Cottage

M46

M45

M41

M40

AYLESBURY VALE DISTRICT

Rosehill Farm

Rosehill Cottages

85+000

84+000

M42

M39

Padbury Brook

CHERWELL DISTRICT

M44

M43

Legend

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary

Archaeological features
- Bank
- Ditch
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure

- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature

Location Map

Map Number: CH-004-13.07

Map Name: Remote Sensing Survey Interpretation

Community Forum Area CFA13: Calvert, Steeple Claydon, Twyford & Chetwode

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number: C252-ETM-EV-MAP-020-002597-P03.00

Date: 06/09/13

The Old Vicarage
Chetwode
SCHOOL END
THE GREEN
School End
AYLESBURY VALE DISTRICT
The Hermitage
Rosehill Farm
Rosehill Cottages
Manthorn Farm
Barton Hill Farm
Chetwode Grange
M56
M11
M51
M52
M46
M45
M59
M09
M08
M50
M06
M10
M07
M53
M47
M49
86+000
85+000
M55
M54
M48
M44

Legend

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary

Archaeological features
- Bank
- Ditch
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure

- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature

Location Map

Map Number: CH-004-13.08

Map Name: Remote Sensing Survey Interpretation

Community Forum Area CFA13: Calvert, Steeple Claydon, Twyford & Chetwode

Scale at A3: 1:5,000

0 50 100 150 200 Metres

Doc Number: C252-ETM-EV-MAP-020-002598-P03.00

Date: 06/09/13

CALVERT, STEEPLE CLAYDON, TWYFORD AND CHETWODE

NEWTON PURCELL TO BRACKLEY

Field Cottages
Barton Hartshorn
Manor Farm
Church Copse
Home Farm
The Old Vicarage
Barley Fields
AYLESBURY VALE DISTRICT
School End
SCHOOL END
CHERWELL DISTRICT
Barleyfields Barn Farm
Barton Hill Farm
Newton Purcell
Weare Street Cut
A421

M57
M11
M08
M49
M10
N08
N04
M56
M58
M53
N03
88+000
87+000
N05
N01
N02
N07
M54
M55
N06

Legend

- Route in tunnel
- Route on surface
- Community forum boundary
- District/Borough boundary
- Watercourse
- Water body
- Woodland
- Remote sensing survey boundary

Archaeological features
- Bank
- Ditch
- Extant ridge and furrow direction
- Levelled ridge and furrow direction
- Structure
- T-Hachure

- Extent of Area
- Bank
- Ditch
- Extant ridge and furrow outline
- Levelled ridge and furrow outline
- Structure
- Large cut feature

Location Map

Map Number: CH-004-13.09

Map Name: Remote Sensing Survey Interpretation

Community Forum Area CFA13: Calvert, Steeple Claydon, Twyford & Chetwode

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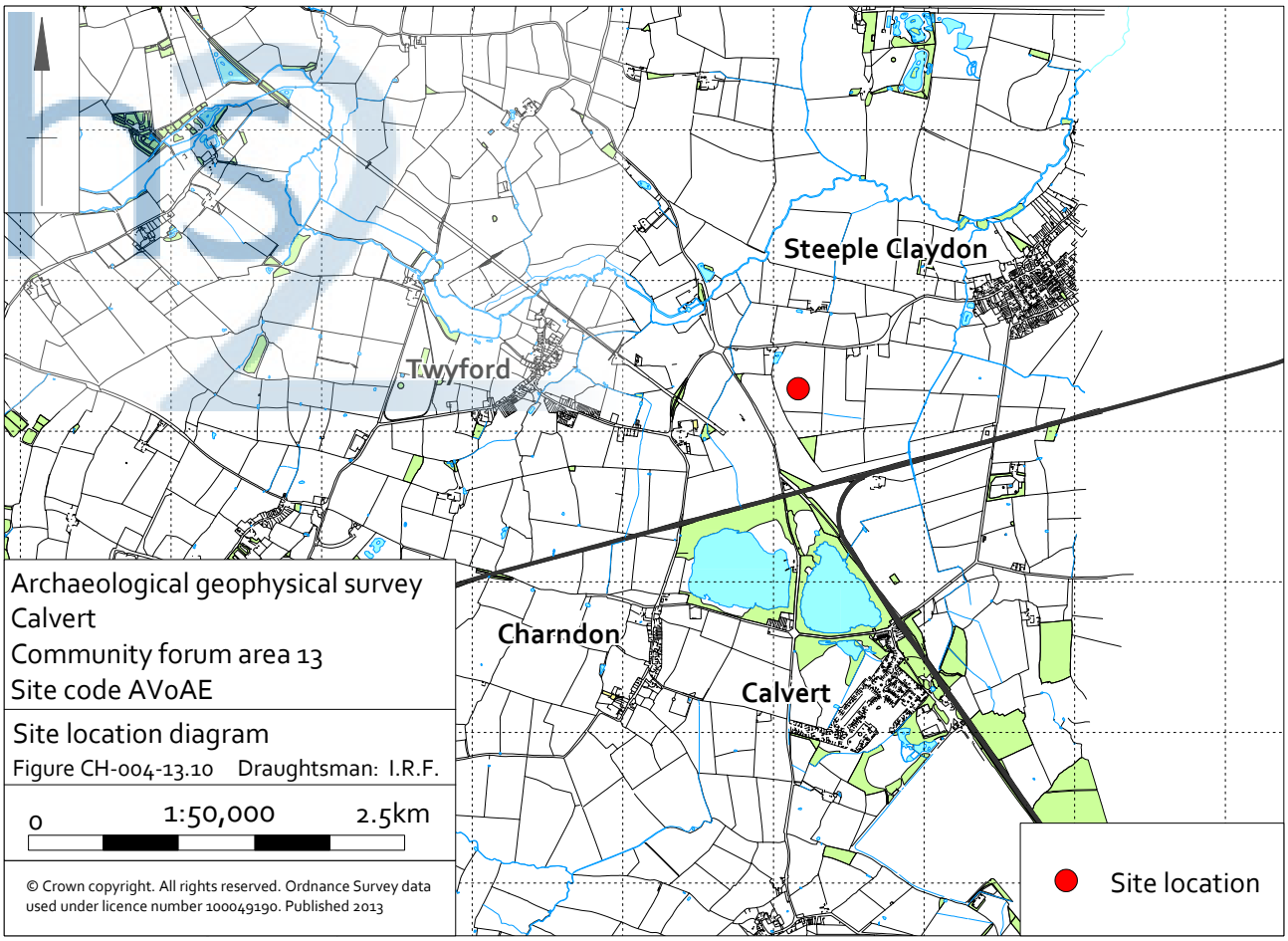
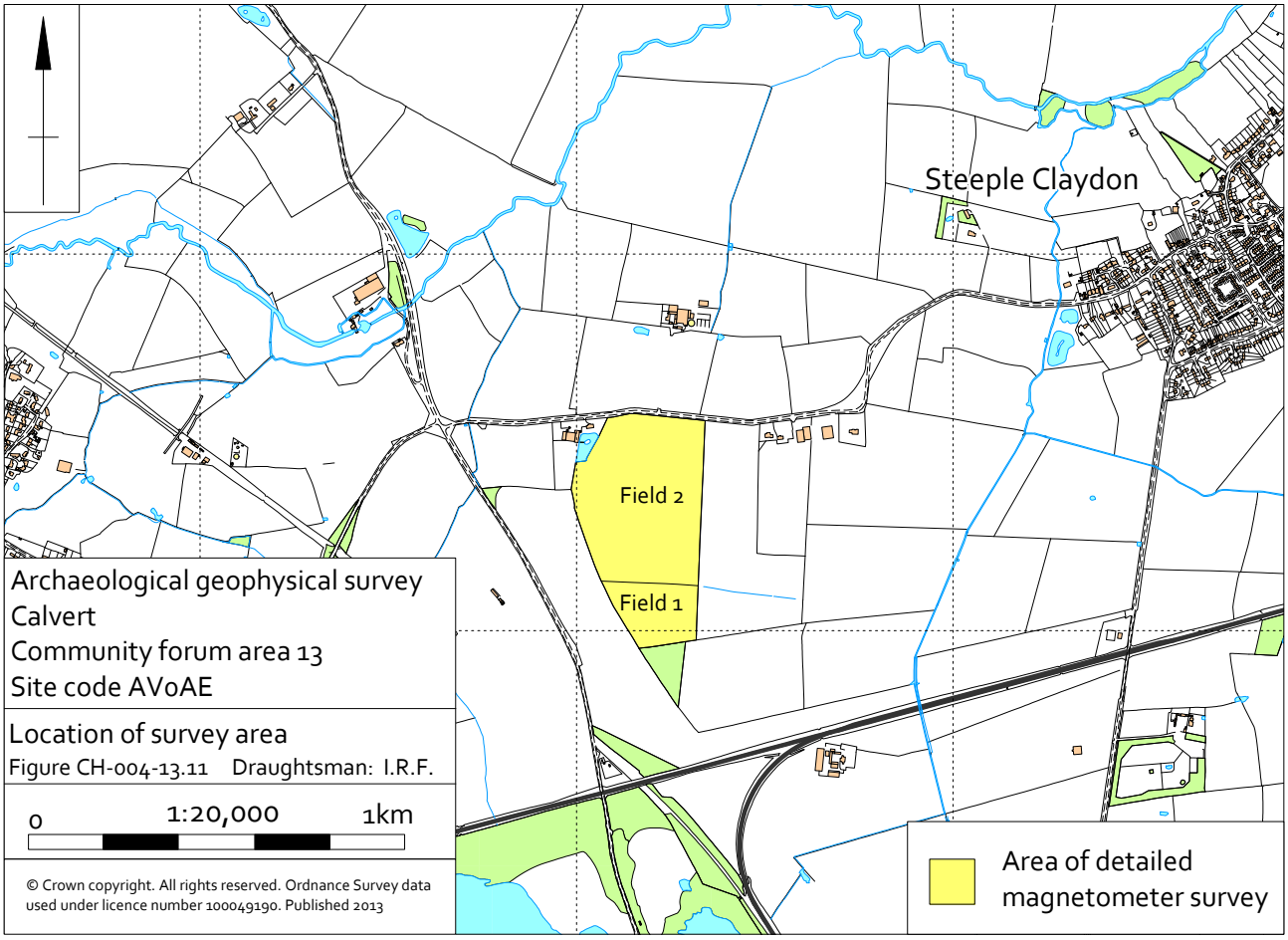
Date: 06/09/13



Archaeological geophysical survey
Calvert
Community forum area 13
Site code AVoAE

Site location diagram
Figure CH-004-13.10 Draughtsman: I.R.F.

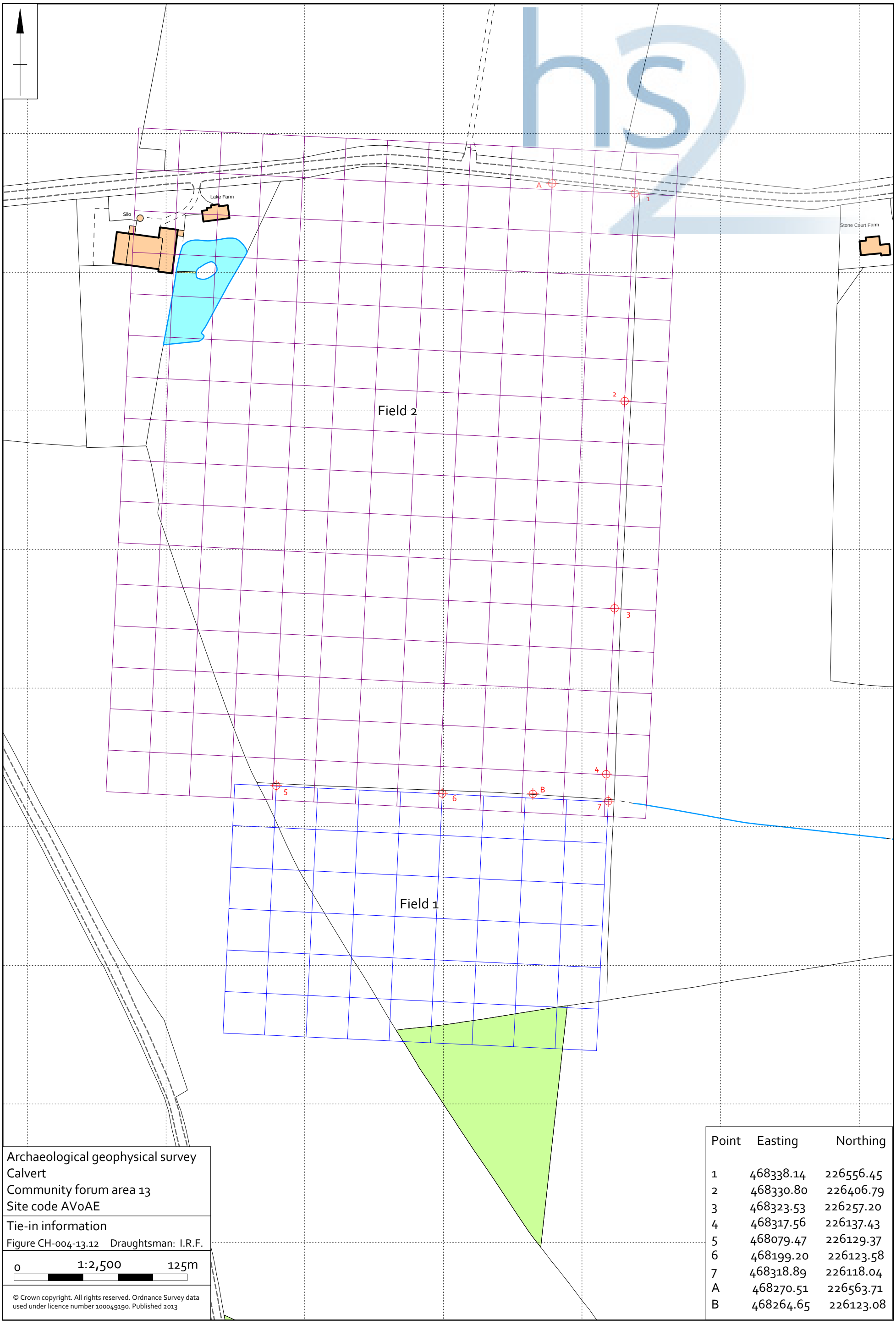
0 1:50,000 2.5km



Archaeological geophysical survey
Calvert
Community forum area 13
Site code AVoAE

Location of survey area
Figure CH-004-13.11 Draughtsman: I.R.F.

0 1:20,000 1km



Archaeological geophysical survey
Calvert
Community forum area 13
Site code AVoAE

Tie-in information

Figure CH-004-13.12 Draughtsman: I.R.F.

0 1:2,500 125m

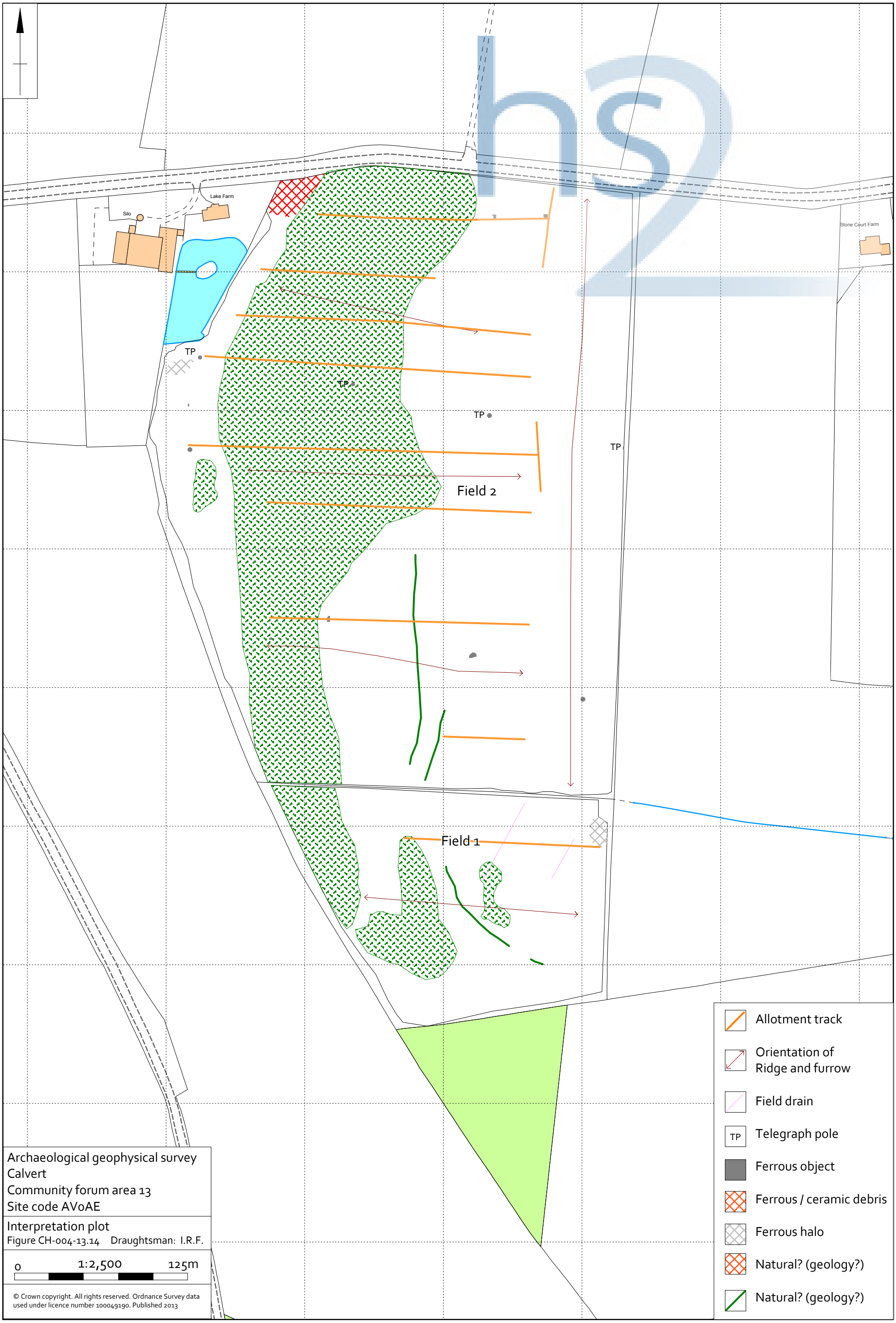
Point	Easting	Northing
1	468338.14	226556.45
2	468330.80	226406.79
3	468323.53	226257.20
4	468317.56	226137.43
5	468079.47	226129.37
6	468199.20	226123.58
7	468318.89	226118.04
A	468270.51	226563.71
B	468264.65	226123.08

Archaeological geophysical survey
Calvert
Community forum area 13
Site code AVoAE

Magnetometer data plot
Figure CH-004-13.13 Draughtsman: I.R.F.

0 1:2,500 125m

Magnetic anomaly /nT
-4nT 0 +4nT


Lake Farm
Silo
Stone Court Farm
TP
TP
TP
TP
Field 2
Field 1
Archaeological geophysical survey
Calvert
Community forum area 13
Site code AVoAE
Interpretation plot
Figure CH-004-13.14 Draughtsman: I.R.F.
0 1:2,500 125m
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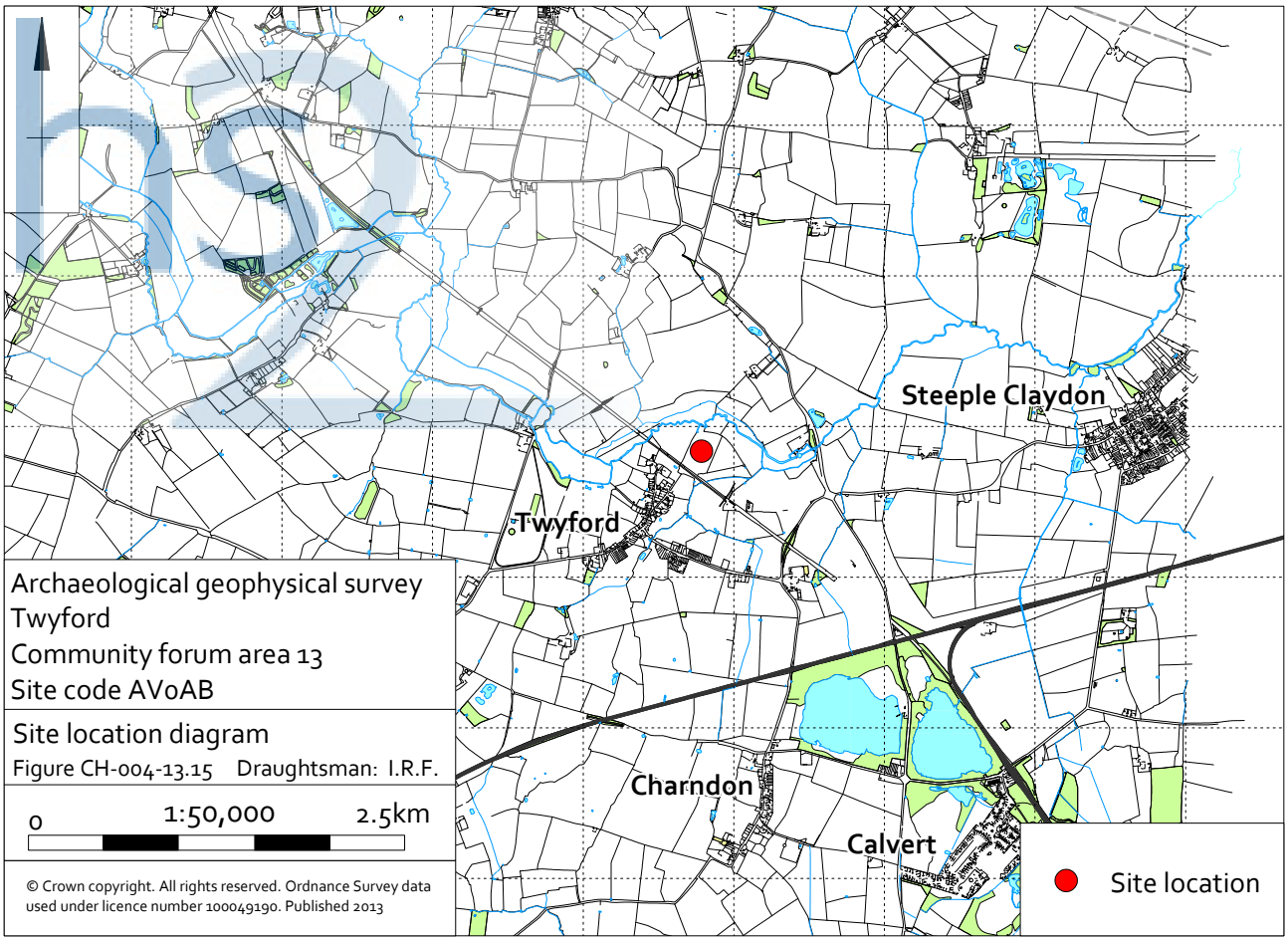
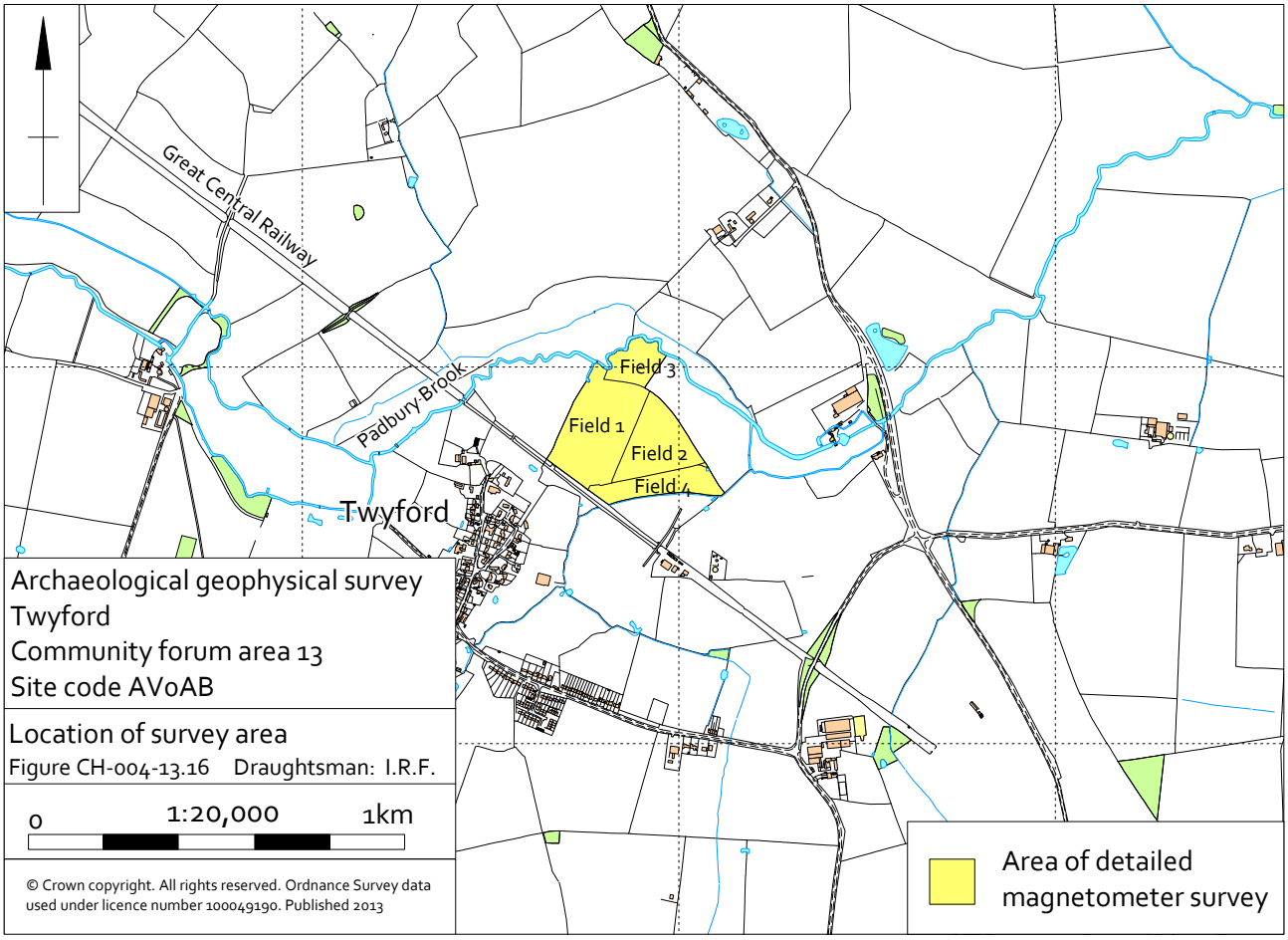
Allotment track
Orientation of Ridge and furrow
Field drain
TP Telegraph pole
Ferrous object
Ferrous / ceramic debris
Ferrous halo
Natural? (geology?)
Natural? (geology?)



Archaeological geophysical survey
Twyford
Community forum area 13
Site code AVoAB

Site location diagram
Figure CH-004-13.15 Draughtsman: I.R.F.

0 1:50,000 2.5km



Archaeological geophysical survey
Twyford
Community forum area 13
Site code AVoAB

Location of survey area
Figure CH-004-13.16 Draughtsman: I.R.F.

0 1:20,000 1km

Field 1

Field 2

Field 3

Field 4

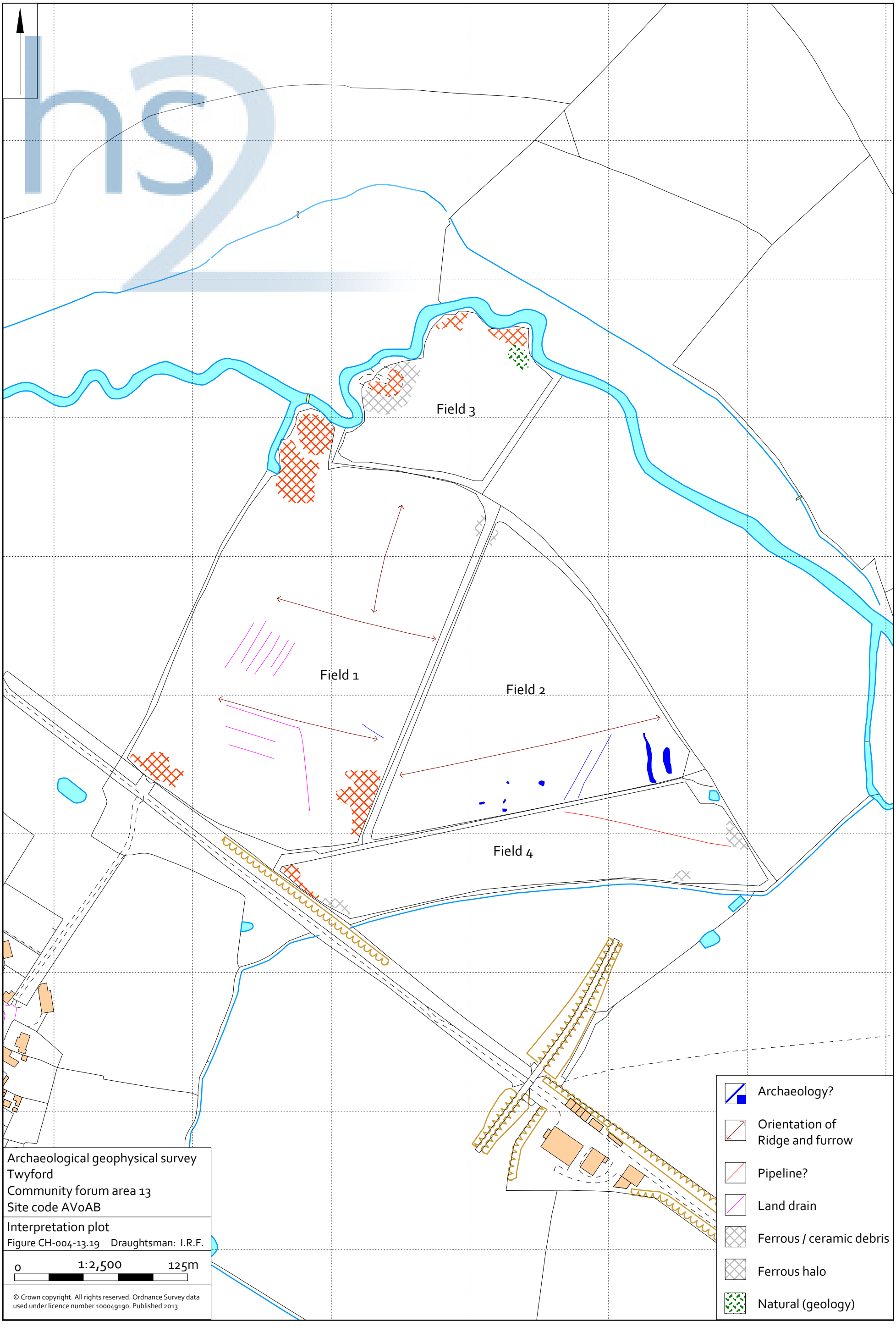
Point	Easting	Northing
1	446941.77	227002.67
2	446906.81	226954.06
3	446910.08	226923.68
4	466865.31	226812.12
5	466820.39	226700.76
6	446916.61	226922.64
7	446872.67	226811.96
8	446827.85	226700.77
9	446760.87	226675.55
10	466907.48	226706.23
11	467055.09	226736.98
A	466667.03	226743.16
B	466765.54	226681.94

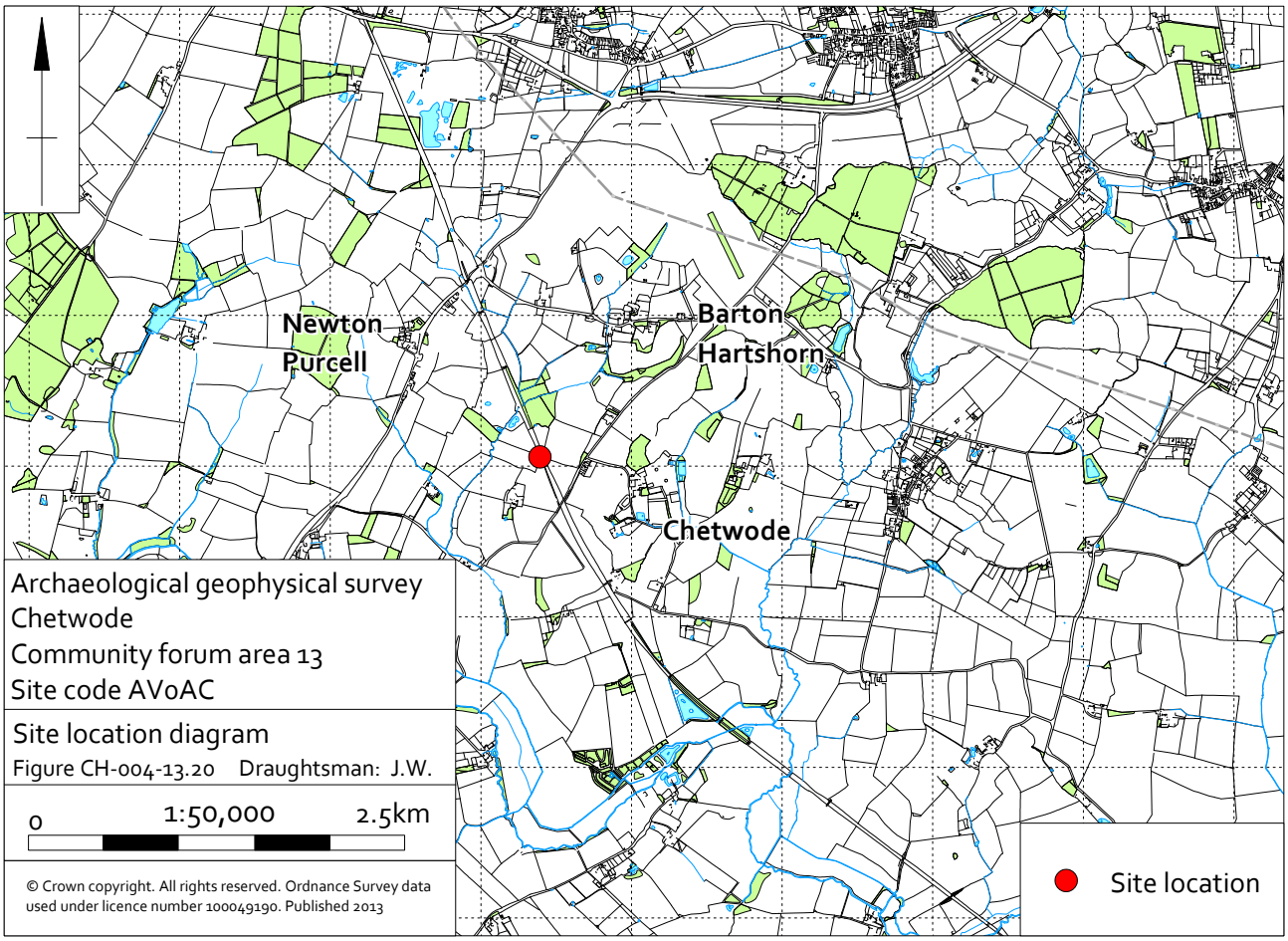
Archaeological geophysical survey
Twyford
Community forum area 13
Site code AVoAB

Tie-in information

Figure CH-004-13.17 Draughtsman: I.R.F.

0 1:2,500 125m

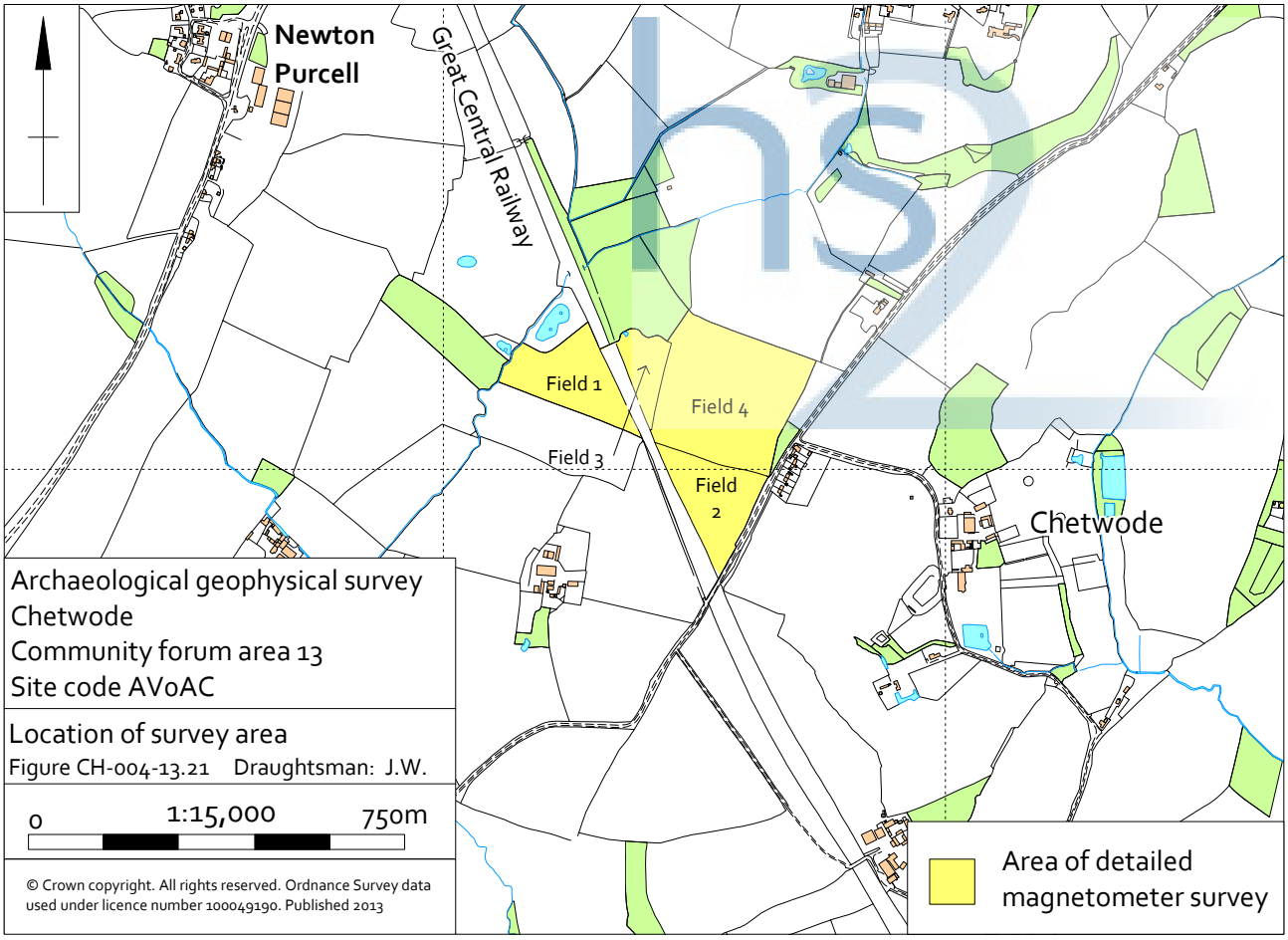




Archaeological geophysical survey
Chetwode
Community forum area 13
Site code AVoAC

Site location diagram
Figure CH-004-13.20 Draughtsman: J.W.

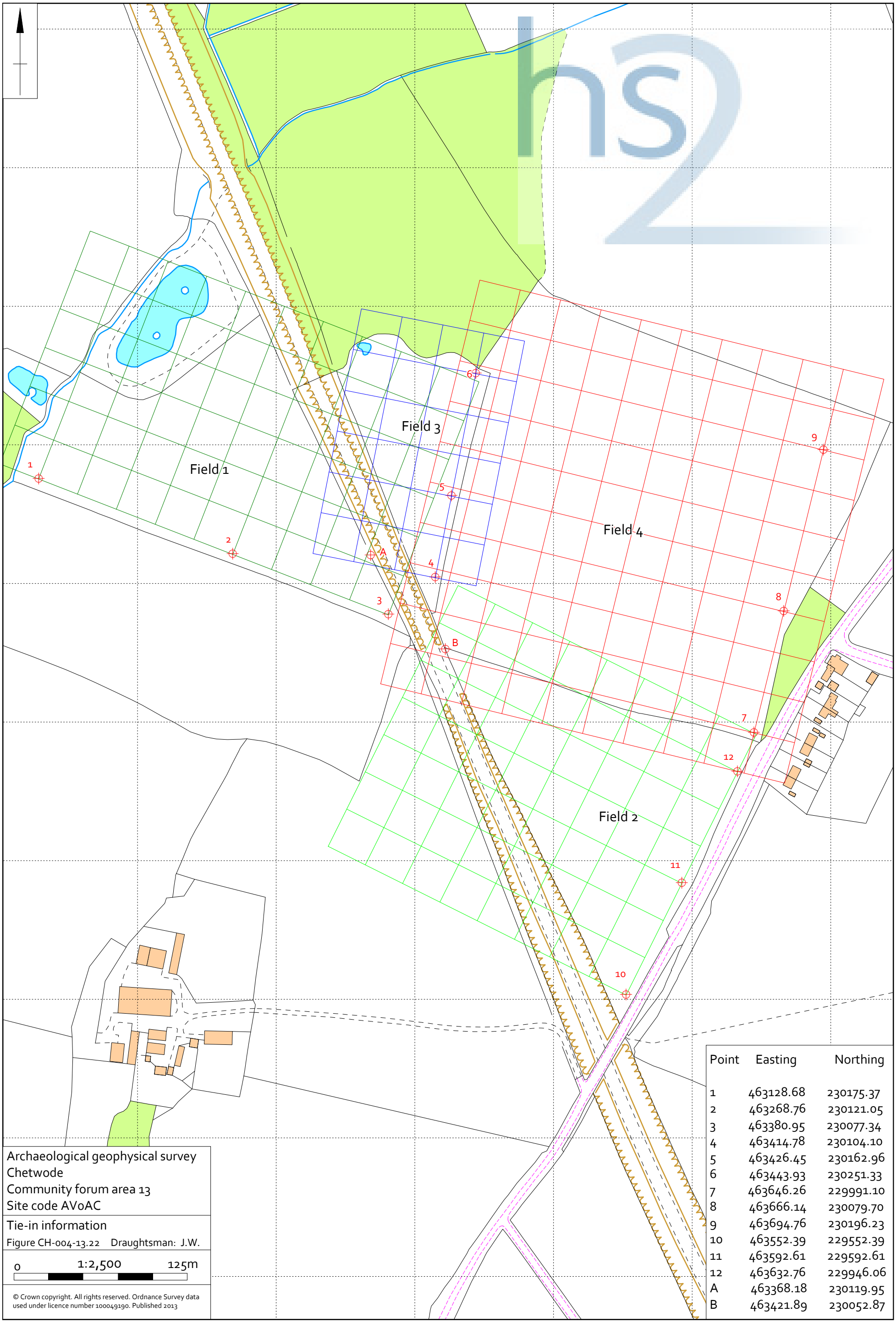
0 1:50,000 2.5km



Archaeological geophysical survey
Chetwode
Community forum area 13
Site code AVoAC

Location of survey area
Figure CH-004-13.21 Draughtsman: J.W.

0 1:15,000 750m



Archaeological geophysical survey
Chetwode
Community forum area 13
Site code AVoAC

Tie-in information

Figure CH-004-13.22 Draughtsman: J.W.

0 1:2,500 125m

Point	Easting	Northing
1	463128.68	230175.37
2	463268.76	230121.05
3	463380.95	230077.34
4	463414.78	230104.10
5	463426.45	230162.96
6	463443.93	230251.33
7	463646.26	229991.10
8	463666.14	230079.70
9	463694.76	230196.23
10	463552.39	229552.39
11	463592.61	229592.61
12	463632.76	229946.06
A	463368.18	230119.95
B	463421.89	230052.87

Field 3

Field 4

Field 1

Field 2

Archaeological geophysical survey
Chetwode
Community forum area 13
Site code AVoAC

Magnetometer data plot
Figure CH-004-13.23 Draughtsman: J.W.

0 1:2,500 125m

Magnetic anomaly /nT
-4nT 0 +4nT

Field 1

Field 2

Field 3

Field 4

Archaeological geophysical survey
Chetwode
Community forum area 13
Site code AVoAC

Interpretation plot
Figure CH-004-13.24 Draughtsman: J.W.

0 1:2,500 125m

Linear trend

Orientation of Ridge and furrow

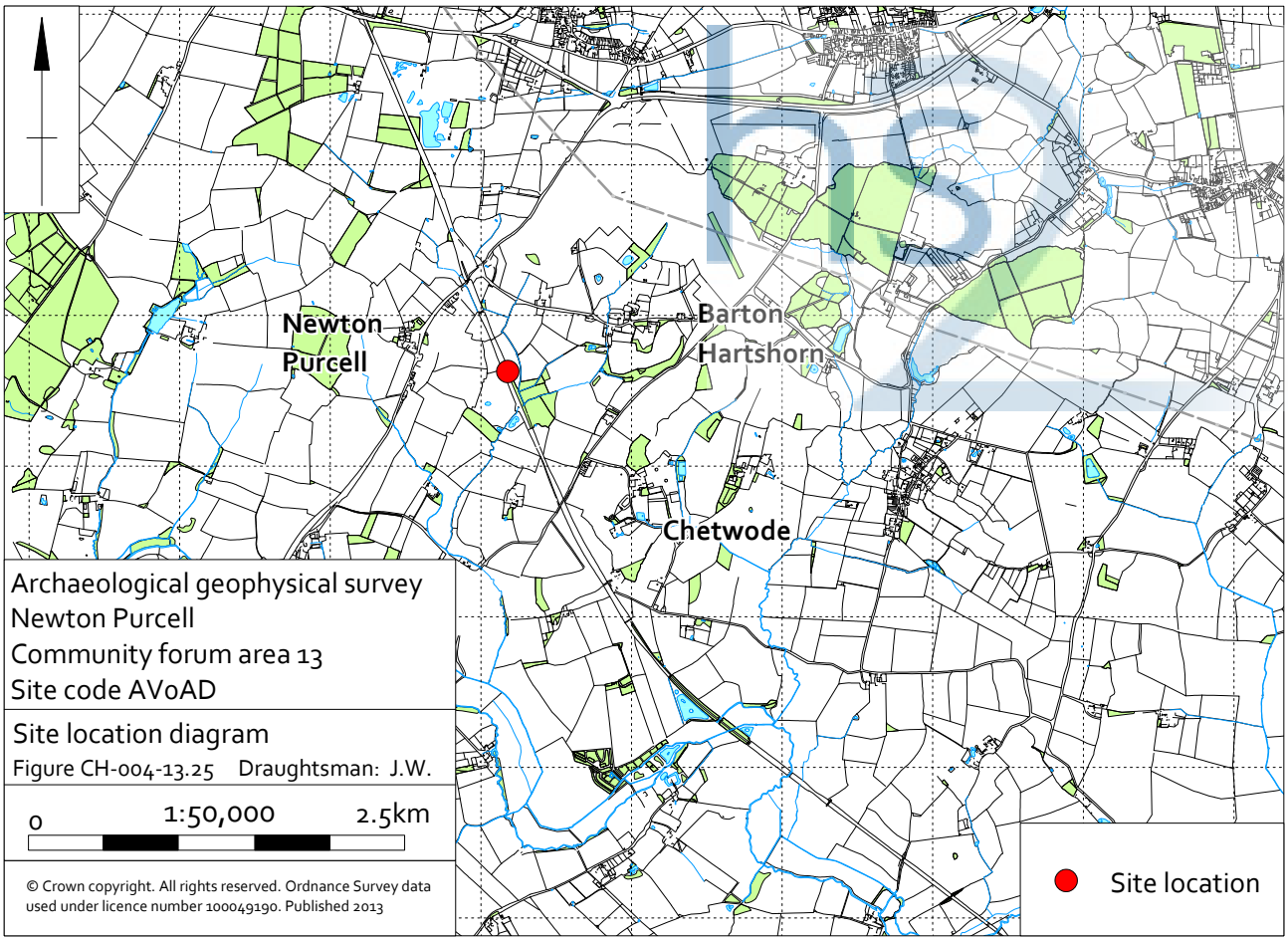
Pipeline

Ferrous / ceramic debris

Ferrous object

Ferrous halo

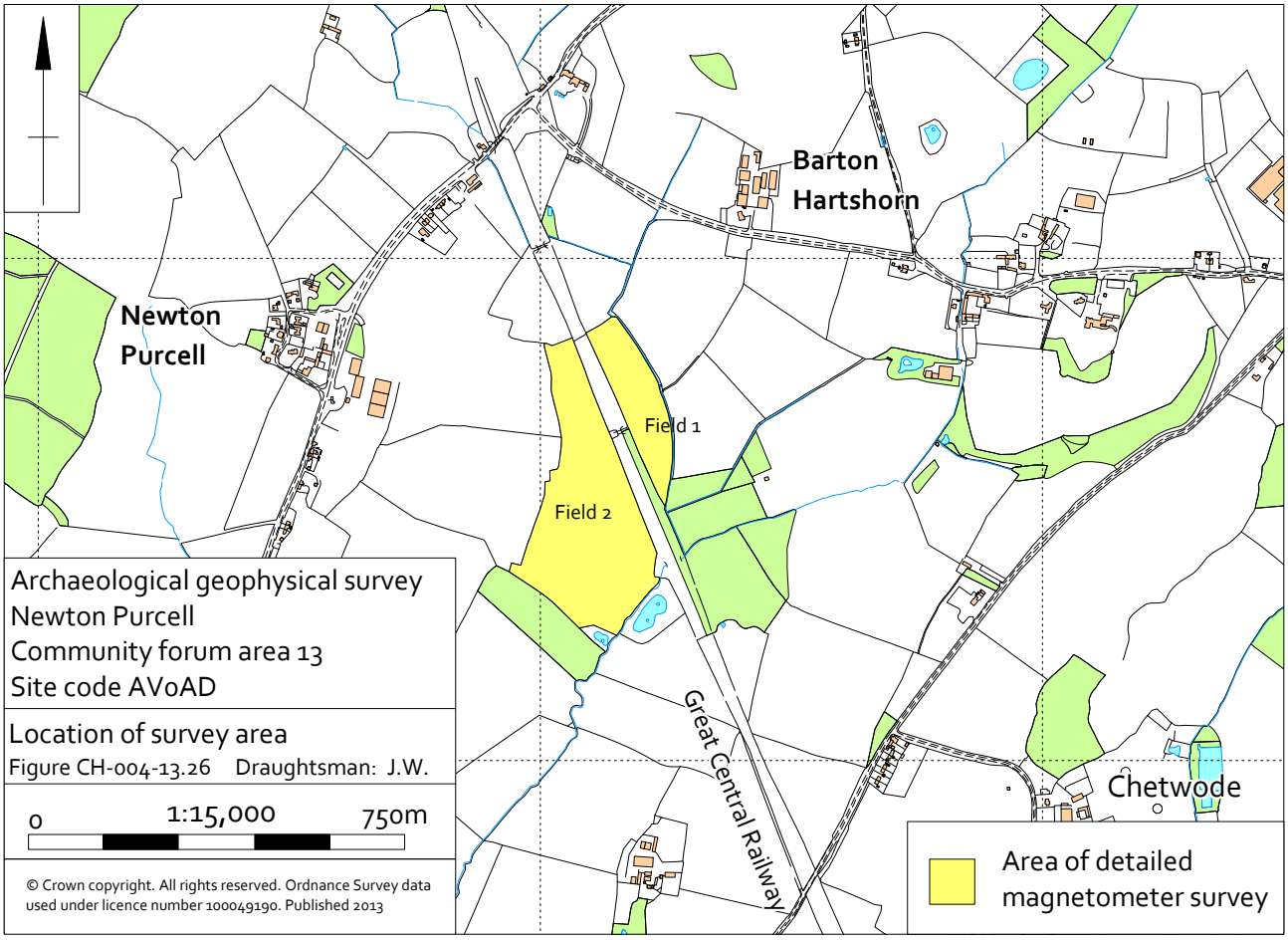
Natural? (geology?)



Archaeological geophysical survey
Newton Purcell
Community forum area 13
Site code AVoAD

Site location diagram
Figure CH-004-13.25 Draughtsman: J.W.

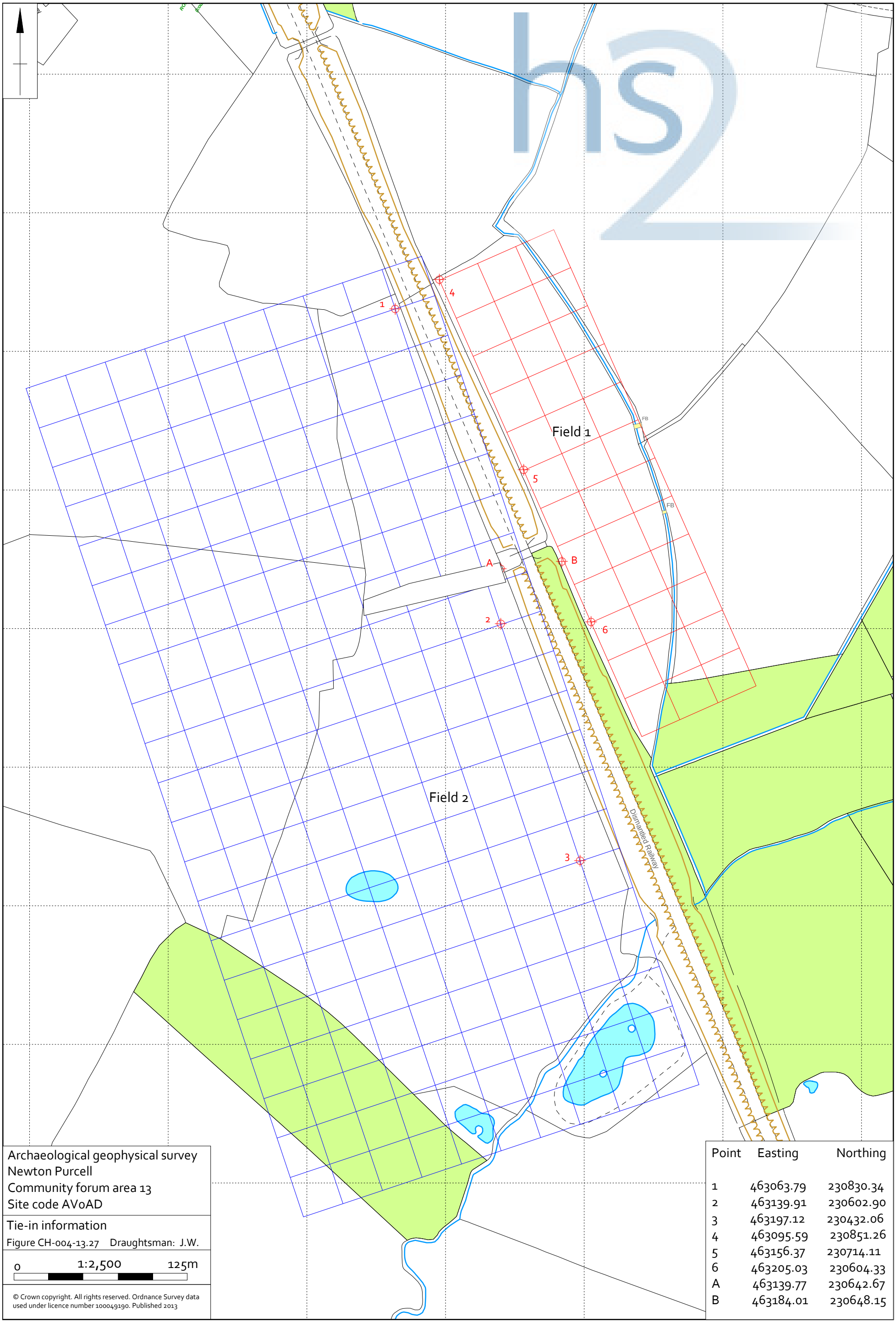
0 1:50,000 2.5km



Archaeological geophysical survey
Newton Purcell
Community forum area 13
Site code AVoAD

Location of survey area
Figure CH-004-13.26 Draughtsman: J.W.

0 1:15,000 750m



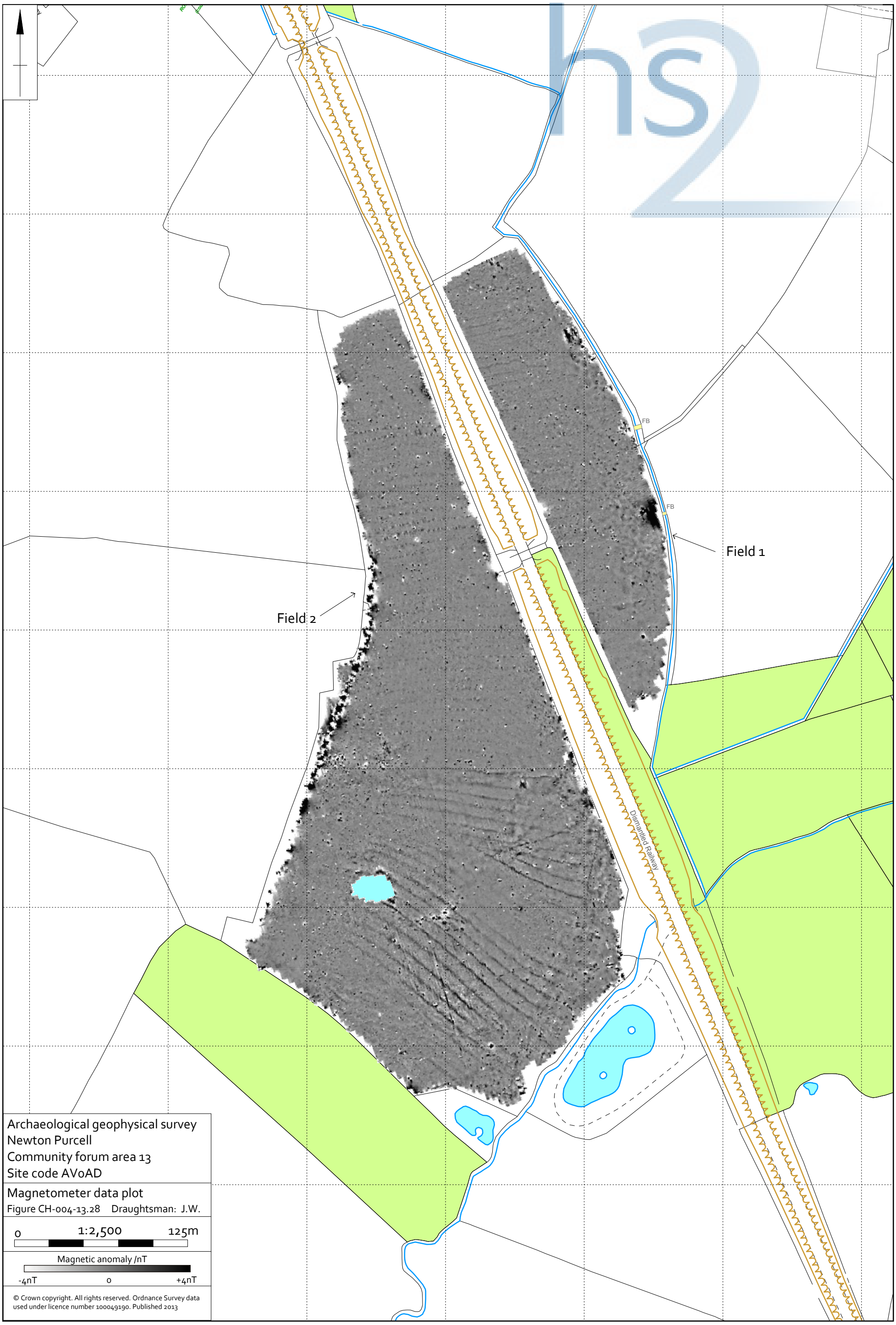
Archaeological geophysical survey
Newton Purcell
Community forum area 13
Site code AVoAD

Tie-in information

Figure CH-004-13.27 Draughtsman: J.W.

0 1:2,500 125m

Point	Easting	Northing
1	463063.79	230830.34
2	463139.91	230602.90
3	463197.12	230432.06
4	463095.59	230851.26
5	463156.37	230714.11
6	463205.03	230604.33
A	463139.77	230642.67
B	463184.01	230648.15

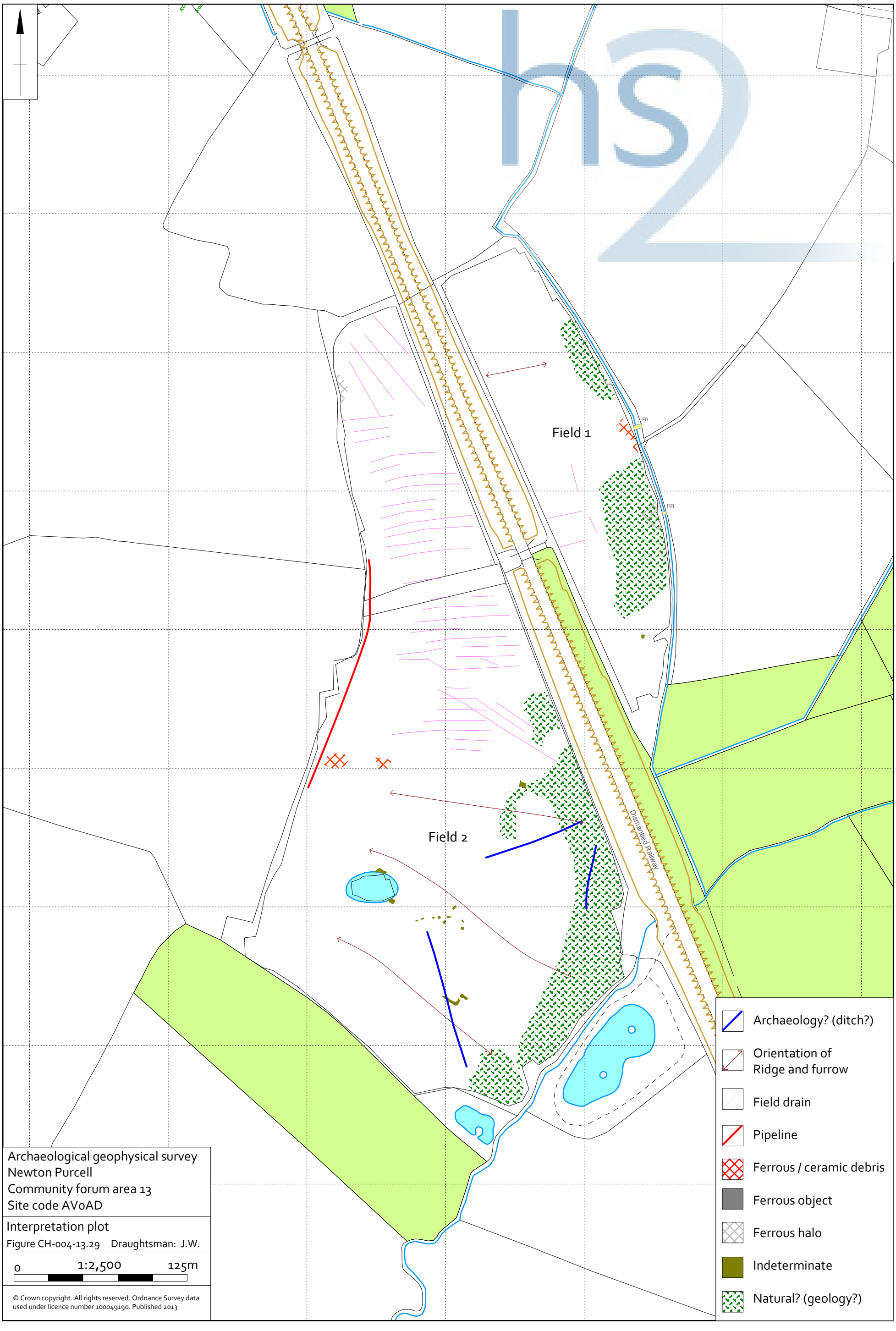


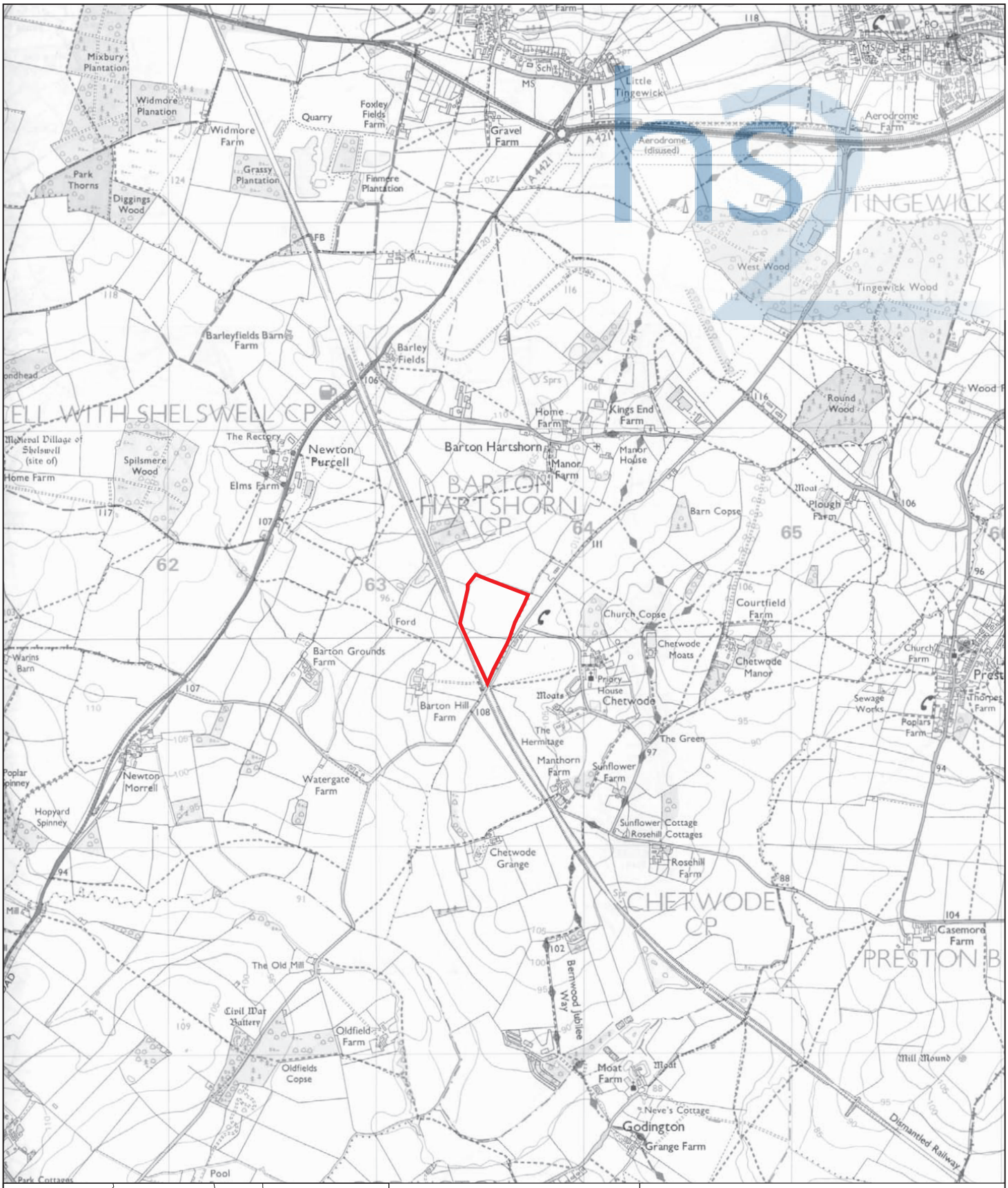
Archaeological geophysical survey
Newton Purcell
Community forum area 13
Site code AVoAD

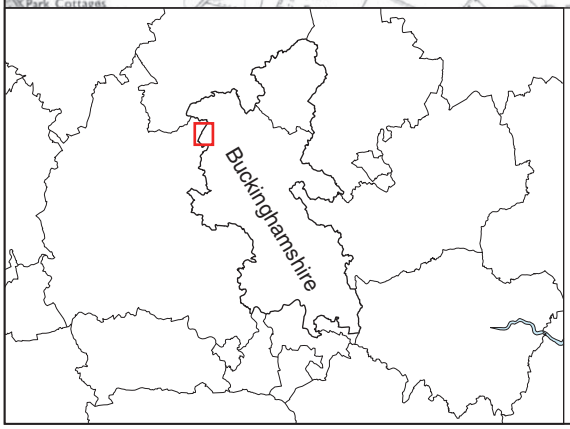
Magnetometer data plot
Figure CH-004-13.28 Draughtsman: J.W.

0 1:2,500 125m

Magnetic anomaly /nT
-4nT 0 +4nT







N

0 1km

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Andover 01264 326549
w www.cotswoldarchaeology.co.uk
e enquiries@cotswoldarchaeology.co.uk

PROJECT TITLE

Site AV0AC: Land west of Chetwode Buckinghamshire

FIGURE TITLE

AV0AC: Fieldwalking survey. Site location plan

PROJECT NO.	660122	DATE	25-09-2013	FIGURE NO.
DRAWN BY	JB	REVISION	00	
APPROVED BY	PJM	SCALE@A4	1:25,000	CH-004-13.30

463500

230000

Pond

Pond

Field 2

Field 1

The Old Vicarage

CDH

109.8m

1.22m RH

109.8m

School House

Four Firs

School End

1

2

3

6

School End

Def

109.9m

1.22m RH

Path (um)

Def

N

site

areas subject to fieldwalking

transect lines

flint flake - count

1

medieval pot - count

1

post-medieval/modern - count

1

2

post-medieval cbm - weight (g)

5 - 41

42 - 76

77 - 112

113 - 147

0 100m

Cotswold Archaeology

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PROJECT TITLE

Site AV0AC: Land west of Chetwode Buckinghamshire

FIGURE TITLE

AV0AC: Fieldwalking survey. Prehistoric, medieval and post-medieval/modern finds

PROJECT NO. **660122** DATE **25-09-2013** FIGURE NO.
DRAWN BY **JB** REVISION **00**
APPROVED BY **PJM** SCALE@A3 **1:2,000** **CH-004-13.31**